



COMMERCIAL FISHERIES ABSTRACTS

C. F. T. R. I.
FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES





UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

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0.6A (*)	A SYMPOSIUM ON FISH PIGMENTS IN FUNDAMENTAL AND APPLIED ASPECTS	Bulletin of the Japanese Society of Scientific Fisheries 33, No. 9, 853-912 (September 1967) (In Japanese with English summaries)	Foreword.--by F. Matsuura (Univ. of Tokyo, Tokyo, Japan), pp. 853 & 906. Since the color of aquatic animals varies widely, the implication is that there are many different kinds of pigments in fish. Because the color of seafood, as well as its flavor and taste, is important in the evaluation of food quality, intensive research has been done on the biochemical, the physicochemical, and the practical problems posed by these variations in color. However, many of the problems are still unsolved. To stimulate further research on these problems as they affect the use of fish as food, participants at a symposium held at the University of Tokyo on April 5, 1967, reviewed the work done so far and discussed possible future solutions. Nine subjects were treated during the symposium. The first four deal with the fundamental nature of fish pigments; the last five concern problems of a practical nature. 1. Hemoproteins of Fish.--by Kanehisa Hashimoto (Univ. of Tokyo, Bunkyo-ku, Tokyo), pp. 854 & 907. Myoglobin is the most dominant hemoprotein in the red meat of such fish as tuna; thus, it is most influential on the color of the meat. In fish and mammalian myoglobin, the molecular weight, iron content, and prosthetic groups are the same; the hyperbolic oxygen dissociation curve, the very *Item on back of card. (over)	0.6C (*)	A SYMPOSIUM ON FISH PIGMENTS IN FUNDAMENTAL AND APPLIED ASPECTS	Bulletin of the Japanese Society of Scientific Fisheries 33, No. 9, 910 ff. (September 1967)	6. Blue or Green Meat of Tuna Fishes.--by Chiaki Koizumi (Tokyo Univ. of Fish., Minato-ku, Tokyo), pp. 883 & 910. The problem of greening in frozen swordfish and cooked tuna is examined. Investigators have shown that the green pigment in frozen swordfish is sulfhemoglobin, a combination of hemoglobin and hydrogen sulfide that has been formed by bacterial action. The discoloration can be prevented by using good quality fish and freezing it rapidly before bacterial action can begin. The tannish-green color that normally pink tuna takes on upon being cooked has been attributed to the presence of trimethylamine oxide (TMAO) in the raw fish--the greater the concentration of TMAO, the more pronounced the greening. Cysteine has been suggested as another greening factor. Although a mixture of purified tuna myoglobin, TMAO, and cysteine has been proposed as a model for research on the problem, the nature of the green pigment is as yet unknown. [47 references] 7. Discoloration of Carotenoids in Marine Products.--by Mitsuo Hata (Fac. of Agr., Tohoku Univ., Sendai), pp. 889 & 910. The red color caused by carotenoids in the skin, muscle, and ovary of some fish fades during storage and processing, resulting in decreased value of the product. Research has shown two reasons for the fading, isomerization and oxidation. *Item on back of card. (over)
0.6B (*)	A SYMPOSIUM ON FISH PIGMENTS IN FUNDAMENTAL AND APPLIED ASPECTS	Bulletin of the Japanese Society of Scientific Fisheries 33, No. 9, 908 ff. (September 1967) (In Japanese with English summaries)	3. Carotenoids in Fish.--by Shuichi Hirao (Tokai Reg. Fish. Res. Lab., Chuo-ku, Tokyo), pp. 866 & 908. The kinds of carotenoids generally found in fish number only five or six; however, if the minor and unidentified carotenoids that are occasionally found are included, the total may be 20 or more. In most fish, 90 percent of the carotenoids are in the skin; in salmonoid fish, however, 90 percent are in the flesh, ovary, and viscera. The carotenoid in the egg often differs from that in the skin. Although the proportion of carotenoids in a given fish may be a characteristic of the species, it can vary with the age and sex of the fish, the season of the year, and the biological and dietary condition of the fish. The composition of carotenoids in fresh-water and coastal fishes is more complex than that in ocean fishes. The kinds of xanthin and its distribution among fishes are summarized. [29 references] 4. Biological Aspects of Coloration in Fish.--by Takashi Hibiya (Univ. of Tokyo, Bunkyo-ku, Tokyo), pp. 872 & 909. The shade, tint, and pattern of a fish have important physiological, ecological, and pathological meanings. The short-term color change in a fish's body is due to movement of pigment granules in chromatophores of the skin. Such movement of melanin granules with melanophore is usually under the dual control of the nervous and the endocrine systems. The body (over)	0.6D (*)	A SYMPOSIUM ON FISH PIGMENTS IN FUNDAMENTAL AND APPLIED ASPECTS	Bulletin of the Japanese Society of Scientific Fisheries 33, No. 9, 911 (September 1967)	8. Browning of Fish Muscle.--by Masamichi Toyomizu (Fac. of Agr., Kyushu Univ., Fukuoka), pp. 894 & 911. Browning in fish products is a serious problem, for it is intimately associated with the chemical reactions that cause off-flavors. Rusting by lipid oxidation and the Maillard reaction are primary causes of browning; thus fish products that contain large amounts of lipids and heme compounds are particularly prone to rusting. Browning in freeze-dried dark muscle of jack mackerel, <i>Trachurus japonicus</i> , is caused by lipid oxidation (the removal of lipids and the addition of antioxidants prevent browning), whereas browning of the ordinary muscle is due to Maillard reaction. Browning of ordinary dark muscle proceeds rapidly during storage at 30° C.; leached or dialyzed dark muscle scarcely browns at all. The addition of a low molecular weight fraction obtained by gel filtration from the extracts of dark muscle increases the rate of browning in both leached and ordinary muscle. A similar fraction from the extracts of ordinary muscle has no browning effect. Because higher amounts of hexose appeared in dark muscle than in ordinary muscle, the author investigated the part that sugar plays in the rusting reaction. *Item on back of card. (over)
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Since most of the many double bonds in carotenoids are conjugated, cis-trans or epoxide-furanoid isomerization easily occurs. When a cis-isomer is formed, the absorption spectrum shifts toward wavelengths that are shorter than the original all-trans isomer. In addition, a new cis-peak appears. Because the furanoid isomer has a very different and much less pronounced absorption spectrum than the epoxide isomer has, fading is marked.

PROGRESS IN THE CHILLING AND FREEZING OF FOODS

Bate-Smith, E. C. (Institute of Animal Physiology, Babraham, Cambridgeshire, England)
Journal of Food Technology 2, No. 3, 191-206 (September 1967)

This review is based on papers presented at an institute on the "Low Temperature Biology of Foodstuffs" held at the University of Strathclyde, England, in September 1966. The subject basically concerns the effects of lowering the temperature of biological systems by means of slowing down chemical and enzymic reactions, and additional effects of the removal of water as ice at temperatures below the freezing point. The papers presented cover the molecular structure of water and aqueous solutions, ice crystal nucleation and the formation of ice, protective mechanisms in freezing plants, and physicochemical changes in foods arising from freezing.

Specifically mentioned in this article is the freezing of foods such as aqueous solutions, suspensions, and complex systems; bacteria; fruits and vegetables; eggs; and meat, fish, and poultry. Storage in the frozen state is also mentioned, as is the refrigerated storage of meat, fish, and poultry. Only a brief outline of the contents of these papers is given in this review.

[Abstracter: M. F. Tripple]

[45 references]

Using model dehydrated systems, he studied the chemical reactions in an amino acid-sugar system and an amino acid-sugar-lipids system. He noted that the sodium bisulfite that inhibited the browning reaction in the amino acid-sugar system had no effect on the amino acid-sugar-lipids system; rather, glucose-1-P took part in the browning reaction in the amino acid-sugar-lipids system. [44 references]

Meyer-Warden, P. F. (Institute for Coast and Inland Fisheries, Federal Fisheries Research Center, Hamburg, Germany)
Fette-Seifen Anstrichmittel 68, No. 12, 1057-1061 (December 1966) (In German)

fishes is scarce, and the lack of physiological and metabolic data and urobilinoid in fishes is deplored. [81 references]

2. Bile Pigments of Fish.--Tadashi Nomura (Fac. of Agr., Tohoku Univ., Sendai), pp. 860 & 907. The distributional and physiological features of

high oxygen affinity, and the absence of the Bohr effect are comparable. The absorption spectra, heat and alkali resistibility, solubility, electrophoretic behavior, and autoxidizability are different; however, fish myoglobin has a low basic amino-acid content and a cysteine residue not found in mammalian myoglobin. The N-terminus of carp hemoglobin has two acetylseryl and two valyl residues. Fish hemoglobin analyzed by starch-gel electrophoresis is markedly heterogeneous. The molecular weight, iron content, prosthetic groups, and absorption spectra of fish and mammalian cytochrome c are indistinguishable in the visible region; their ultraviolet absorption and electrophoretic behavior are clearly, though not appreciably, different. Species specificity of cytochrome c in fish

[44 references]

Ice glazing used to protect frozen food from lipid oxidation or desiccation has a bad effect on the color of tuna stored at between -15° and -20° C. Packaging the meat in polyethylene film is more effective in preserving the color.

do in melanophore. [31 references]

5. Discoloration of Tuna Meat During Cold Storage.--by Masamichi Bito (Tokai Reg.^o Fish. Res. Lab., Chuo-ku, Tokyo), pp. 878 & 909. Tuna meat gradually returns brown during cold storage, principally owing to the oxidative change of myoglobin from the ferrous to the ferric state. The influence on discoloration of such factors as temperature, freezing rate, partial pressure of oxygen, pH, salt concentration, and light is reviewed. Of these factors, storage temperature seems to be the most important, although the partial pressure of oxygen is significant. The discoloration of cold-stored tuna filets is rapid at temperatures of from -3° to -10° C. The rate of discoloration at the surface is relatively fast when the temperature is above 0° C.; it is slower when the temperature is between -13° and -20° C. When the temperature is lowered to -35°, the red color is retained by the inner layer, though it is somewhat lost at the surface.

color of fish in which control is largely through the nervous system changes quickly, whereas the color of fish in which control is by a pituitary hormone ((intermedin) changes gradually. Which control is predominant can be determined by cutting nerve fibers, excising the pituitary, or blocking or stimulating the nerves. By such methods, it has been established that the lipid droplets containing carotenoid pigments move in erythrocytes and xanthophores as melanin granules

1.26 (*) Egenaes, W. Nitter Ocean Fisheries 3, No. 4, 7-8 (October 1967) Capelin (<i>Mallotus villosus</i>) is a small Arctic fish of the smelt family, which is used for food by the Eskimos and for bait or the manufacture of fish oil and meal by the Norwegians. The catch of capelin today is about 600,000 tons; capelin is becoming a tonnage item of consequence in the European fishery and may eventually rank high among the world's great catch components. Most of the capelin fishery is pursued by the Norwegians off the extreme north coast of Europe; however, there is vast potential for expansion of the capelin fishery of the U.S.S.R. and Canada. Current capelin fisheries are confined to the spawning populations during the spring months. Only the spawning stock appears in the Norwegian waters, and fishing is usually confined to the coastal waters of Finnmark, Norway's most northerly province. Since 1957, when the winter herring fishery off western Norway declined, the capelin resource has received national attention. As the capelin fishery fitted into the space between seasons for other surface species, it soon became established as an important complementary operation. The 1961 and 1965 catches were 217,000 metric tons; the 1966 and 1967 catches were 379,000 and 418,000 tons, respectively. There were 260 vessels engaged in the capelin fishery in 1966, with an average catch of 1,460 tons per vessel and a high boat seasonal (over) *Item on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple	2.01 BACTERIOLOGICAL SURVEY OF THE FROZEN PREPARED FOODS INDUSTRY. IV - FROZEN BREADED FISH Surkiewicz, Bernard F., Ralph J. Groomes, and L. Robert Shelton, Jr. (Division of Microbiology, Food and Drug Administration, U.S. Department of Health, Education, and Welfare, Washington, D.C. 20204) Applied Microbiology 16, No. 1, 147-150 (January 1968) Since 1958, the U.S. Food and Drug Administration, in cooperation with the Association of Food and Drug Officials of the United States, has been conducting a bacteriological survey of the frozen-foods industry. An initial report of the results obtained from March 1958 to June 1959 was issued in 1960 (Shelton et al., 1960). The first three papers of the current series, which supplements the 1960 report, presented results from surveys of producers of frozen cream-type pies, raw breaded shrimp, and potato products. In this paper, the phase of the survey dealing with producers of frozen, breaded fish sticks and fish portions is reported on. In the fish-processing plants investigated, blocks of frozen fish fillets are unwrapped and fed through bandsaws and guillotine-type cutters, which cut the fillets into desired size and shape. The cut fish are then dropped onto a belt, which conveys them through liquid batter and through a sprinkling of breading material. The batter and breading procedures are usually repeated. The breaded fish may pass through a fryer and then through a freezer, or they may be conveyed (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple
1.36 (*) Hillaby, John New Scientist 35, No. 563, 622-623 (September 21, 1967) BREEDING INLAND SALMON Since prehistoric times, Atlantic salmon has been the source of an enormous and lucrative fishery for countries in northern latitudes. In Britain alone, the returns from the commercial salmon fishery, coupled with those from the salmon sport fishery, have been reckoned at millions of pounds sterling. Yet the uncontrolled exploitation of breeding stocks in the off-Greenland feeding grounds (which seem to be the locale of most, if not all, of the salmon stocks of the North Atlantic) portend disappearance of the fish--before the end of the century, the author suggests. Since efforts to control the fish that go to sea have come to naught, Canadian fishery authorities are attempting to control those that remain in fresh water. The fresh-water varieties are found in the United States, Germany, Norway, and Russia, as well as Canada. In Quebec, they are called "ouananiche," meaning "he who goes everywhere and is found everywhere." Although they are smaller than their anadromous counterparts, they are, according to M. Vianney Legendre, the director of the Wildlife Service's research station in Quebec, in no way distinct from them. On this assumption, he has set a goal of replacing the depleted high-seas resource with a substitute that can be controlled. (over) *Item on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: L. Baldwin ARCTIC CAPELIN FISHERY REPLENISHING ATLANTIC SALMON STOCKS	2.05 SURVIVAL AND OUTGROWTH OF CLOSTRIDIUM BOTULINUM TYPE E SPORES IN SMOKED FISH Christiansen, Lee N., Janet Deffner, E. M. Foster, and H. Sugiyama (Department of Bacteriology and the Food Research Institute, University of Wisconsin, Madison 53706) Applied Microbiology 16, No. 1, 133-137 (January 1968) The percentage of fish carrying <i>Clostridium botulinum</i> Type E spores increases during the stages of processing prior to smoking. Thus, any prevention of botulism from smoked fish depends on the destruction of all <i>C. botulinum</i> Type E spores during smoking or on the inhibition of germination and outgrowth of the spores that may survive in the smoked product. The objectives of the present investigation were (1) to determine whether the recommended heating at 180° F. for 30 min. during smoking would produce a product free from viable Type E spores and (2) to study the effect of NaCl on the outgrowth of Type E spores in smoked fish. Brined chub (<i>Leucichthys hoyi</i>) were injected in the loin muscle with 10⁶ C. botulinum Type E spores. The inoculated fish were smoked to an internal temperature of 180° F. for 30 min., sealed in plastic bags, and incubated at 20° to 25° C. for 7 days. Brine concentrations in the loin muscle were determined after the smoking. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple BACTERIOLOGICAL SURVEY OF BREADED-FISH INDUSTRY SURVIVAL OF CLOSTRIDIUM BOTULINUM IN SMOKED FISH

At this stage of the project, the Canadians have learned that ouananiche will flourish if they are introduced during the premolt stage into lakes at least 5 miles long and deep enough to have surface temperatures that do not exceed 15°-18° C. in summer or about 5° in autumn. When the salmon are ready to spawn, they must have access to streams in which the water flows at a considerable rate (about 0.8 m/sec) and a stream from 20 to 30 feet wide and 4 to 6 feet deep. Although the budding fishery now contains only stocks that have been hatchery nurtured and artificially distributed, the eventual goal is a fishery that will become established through natural replenishment processes.

[Abstract: M. F. Triple]

During the past 15 years fishing in Lake Michigan has declined steadily as the sea lamprey killed the fish of primary commercial value for food--the trout and whitefish. The alewife, which is classified as a trashfish, multiplied rapidly as the lamprey was brought under control. However, the alewife may become useful as a food for the salmon recently introduced into the lake.

Anonymous
Canner/Packer 136, No. 11, 23 (October 1967)

FRESH-WATER SALMON: MICHIGAN FISH MAY SPAWN NEW CANNING BUSINESS

1.3 (Cross Reference: 1.0118)

Several Norwegian capelin catches existed in the fishery, and with-
-xave had a good catch of capelin in 1961. Several Norwegian capelin catches existed in the fishery, and with-
-xave had a good catch of capelin in 1961. Several Norwegian capelin catches existed in the fishery, and with-
-xave had a good catch of capelin in 1961.

Capelin is subject to great fluctuations and will fail to appear in some seasons. The economic character of the fish also varies widely within seasons and in relation to the extent of migration. An oil content as high as 21.5 percent has been recorded. Norwegian fish meal made from capelin is normally offered on a basis of 0.6 percent protein.

What makes the capelin fishery worthwhile is the compact school and the prospect of securing a full haul in a short haul. The slow-moving capelin is a good target for trawlers. For trawlers, the school is a good target for trawlers. For trawlers, the school is a good target for trawlers. For trawlers, the school is a good target for trawlers.

Some of the work carried out in catching and processing tuna and in marketing the canned fish is described with illustrations.

1.120 BOOST FOR THE TUNA MARKET
Albert, J. H.
Food Science Abstracts 1, No. 7, Abstract 67/867 (July 1967)

1.120 BOOST FOR THE TUNA MARKET

The development of Type E toxin in the inoculated and smoked fish depended on the brine level in the fish. None of the fish containing over 2.75 percent brine became toxic; greater percentages of fish were toxic with decreasing salt concentrations. In contrast, viable Type E spores were present in nearly all the smoked fish, regardless of the level of brine. None of 16 samples with 2.75 to 2.99 percent brine was lethal for mice, so 3.0 percent brine is assumed to be the minimal concentration inhibiting germination and outgrowth of surviving spores. If the brine concentration exceeds 3.0 percent, fish inoculated with 10⁶ Type E spores after being smoked do not become botulogenic.

The intramuscular injection of 0.1 milliliter of spore suspension resulted in some leakage back onto the surface of the fish. These spores on the surface could be subjected to dry heat, which is a less effective sterilizing agent than moist heat. The possibility that this combination of factors contributed to the results was investigated. Unbrined fish inoculated with Type E spores were heated in the smoking chamber in atmospheres of different moisture levels. The results showed that additional moisture in the heating atmosphere had no significant effect on the percentages of fish having Type E spore survivors. Smoking the fish sealed in plastic pouches gave the same results as processing the fish in a moist environment; viable Type E spores were present in 68 percent of the fish.

Fish not injected with Type E spores were used as controls in the experiments. Comparatively low, but significant, numbers of the control fish became toxic. This occurred even when sterilized fish were used as controls.

[18 references]

through a freezer without being fried. The breaded fish are packed by hand into cartons, which are put into cases and placed in frozen storage.

During the inspections of 23 breaded-fish processors, 573 finished product units and 604 line samples were collected and bacteriologically analyzed. Data for the finished product units that were processed on the same date are presented in groups; most of the groups consisted of 10 such units. Included in the study were groups of frozen, raw, breaded fish products under good and poor sanitation conditions.

No more than 20 percent of the units in each group produced under good sanitation conditions were positive for *Escherichia coli* or coagulase-positive staphylococci. Groups of frozen, fried, breaded fish produced under good and poor sanitary conditions were also studied; no more than 10 percent of the units in each good sanitation group were positive for *E. coli* or coagulase-positive staphylococci. However, about 30 percent of the groups processed under poor sanitary conditions did not exceed these viable bacterial counts because of the lethal effect of the last frying to which the product is subjected.

The authors found that samples collected from the processing lines reflected the sanitary conditions of the plant and provided bacteriological support for inspectional evidence of plant sanitation. For firms with good sanitation, samples of breaded fish collected just before entry to the fryer had aerobic plate count values ranging from 22,000 to 141,000 per gram. Equivalent samples collected from firms with poor sanitation had values ranging from 150,000 to 1,000,000 per gram.

2.1112A A METHOD FOR TAPERING PURSE SEINES

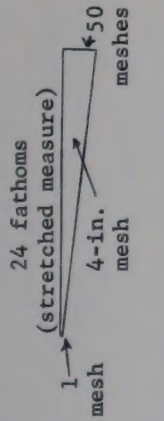
Jurkovich, Jerry E. (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Seattle, Washington 98102)
Commercial Fisheries Review 29, No. 11, 71-78 (November 1967) (Separate No. 802)

For the past decade, salmon fishermen in the Pacific Northwest have inserted wedge-shaped sections of netting between the strips that make up their seines. The resulting tapered seine can be fished near shore without the fisherman's having to spend the usual amount of time contending with deep sections of net that dangle near the bottom or deep gavels that tend to foul the purse lines. The tapered seine's worth in the salmon fishery has been proved; its use in other in-shore fisheries, though still to be proved, may also be of value.

Most fishermen can cut wedge-shaped sections of net if they need to, but few can cut a wedge of predetermined length on the first try. Since inaccurate cuts are costly, the author shows fishermen how to avoid the guesswork. He gives step-by-step procedures for computing the angle of taper required for a wedge of given length, for cutting the net, and for inserting the resulting wedge.

A. Computing the taper

1. Draw a sketch of the desired wedge.
2. Determine the number of meshes along the horizontal edge of the wedge and round off the result to the nearest 50. In the instance illustrated above, there are 18 4-in. meshes (over)



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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

2.1112B A METHOD FOR TAPERING PURSE SEINES

Jurkovich, Jerry E. (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Seattle, Washington 98102)
Commercial Fisheries Review 29, No. 11, 71-78 (November 1967) (Separate No. 802)

When the denominator is an odd number, the (denominator - numerator) ÷ 2 formula will give a fractional result. For example, suppose you wanted the wide end of the wedge-shaped section to be 100 meshes deep instead of 50. The calculations would then go as follows: $MD/ML = 100/450 = 2/9$; (denominator - numerator) ÷ 2 = $(9 - 2) ÷ 2 = 3\frac{1}{2}$ meshes. In this instance, you would have a two-part cutting unit: 2 bars, 3 meshes and 2 bars, 4 meshes. Each part would be alternated until the cut reached the selvage edge. Note that using a 4-bar, 7-mesh cutting unit would give the same overall taper and the identical 24-fathom length. But the chances of miscutting and missewing will be greater than with the 2-bar unit and, since the tapering intervals are larger, the tapered edge will not be as smooth.

B. Cutting the net

If tapered sections are needed at both ends of the seine -

1. Spread a strip of 50-mesh-deep netting evenly on a flat surface; keep the selvage edges approximately parallel.
2. From one end of the lefthand edge, count a full mesh to the right and begin cutting (2 bars, 8 meshes, 2 bars, 8 meshes, etc., in the first example; or (over)

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ABSTRACTER: L. Baldwin

METHOD FOR TAPERING PURSE SEINES

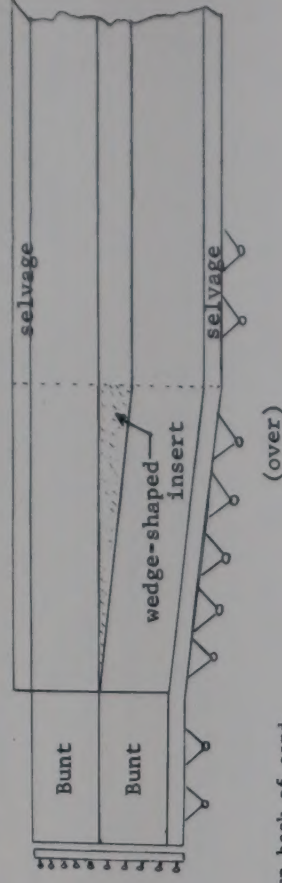
METHOD FOR TAPERING PURSE SEINES

2.1112C A METHOD FOR TAPERING PURSE SEINES

(*)
Jurkovich, Jerry E. (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Seattle, Washington 98102)
Commercial Fisheries Review 29, No. 11, 71-78 (November 1967) (Separate No. 802)

Because the number of meshes was rounded off (450 instead of 432), the tapered section will be 18 meshes, or 1 fathom, too long. Despite this discrepancy, the author suggests that this method of cutting will give far more accurate results than mere random cutting will. Once the cutter becomes familiar with the method, he can make minor compromises that will reduce the amount of discrepancy.

This procedure applies to a seine made of horizontal strips of netting. The salmon purse seine diagrammed below illustrates the end product.



*Item on back of card.

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 5
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

2.1113 ELECTROLYSIS AND GROUNDING SYSTEMS

Race, Fred (Twin City Electronics, Port Alberni, British Columbia)
Western Fisheries 75, No. 3, 53-56 (December 1967)

The author recommends the following approach for the problem of electrolysis in a vessel. The alternator or generator should be grounded by the mounting belts and by a ground strap. If it is a negative ground system, then the negative terminal of the alternator, voltage regulator, and relay box should also be grounded. A positive ground system is grounded in the same way on the appropriate terminals. The engine and appropriate terminal of the battery should be grounded with a good grounding braid wire or heavy electrical cable, using as short a line as possible. A No. 6 or larger wire should be run from the ground plate back to the gurdies to prevent electrolysis from attacking the trolling lines. The propeller shaft is grounded with spring-contact brushes. If the shaft propeller has a rubber coupling, both sides must be grounded. The transmission should be grounded, as the bolts do not give adequate protection.

From the battery terminal, the hot-side wiring should go to a heavy-duty knife switch positioned close to the batteries. From the switch, one line goes to the starting system and another line goes to a main circuit-breaker panel located in the wheelhouse. A ground wire is brought from the ground plate to the panel. All wires are run from this panel through circuit breakers of prescribed amperage rating. Light sockets have the center terminal connected to the hot line through the switch; the outer ring is connected to the ground line. All other (over)

*Item on back of card.

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 5
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

METHOD FOR TAPERING PURSE SEINES

ELECTROLYSIS AND GROUNDING SYSTEMS

RELATIVE EFFICIENCY OF COTTON AND NYLON NETS

2.1126
Anonymous
Central Institute of Fisheries Technology (Ernakulam, India)
Indian Fisheries Bulletin 11, No. 4, 34 (October 1964)

A comparison of the relative efficiency of catching sardines with nylon gill nets, framed cotton gill nets, and fishermen nets revealed the following:

1. Of the three nets, nylon nets take the largest catch, particularly during daytime fishing.
2. Nylon nets tend to damage the catch more than the other nets do.
3. Fish caught in nylon nets are harder to release than those caught in the other two nets.
4. Nylon nets require about one-fourth the maintenance of cotton nets.
5. The size of the fish caught by the three nets is about equal.

[Abstracter: L. Baldwin]

The procedure for computing, cutting, and inserting wedge-shaped sections into a Norwegian tuna purse seine made of vertical strips is also described and illustrated.

2.1117.2

ORGANOTIN COMPOUNDS AS ANTIFOULING INGREDIENTS
AND MARINE WOOD PRESERVATIVES

2.1113
Zedler, Robert J.
Chemical Abstracts 66, No. 24, 105934y (June 12, 1967)

If an electrolysis problem exists, look carefully at the parts affected. If a part is plating or turning black, it is negatively polarized; if a part is plating or turning black, it is positively polarized. Check the grounding system to see if it is positive or negative. The wire that is different from the normal ground is the cause of the problem. Aged wiring can cause electrolysis because leakage through the insulation will act as a resistive short circuit. If this is the case, the wiring must be replaced. If new equipment is added, be sure the installer observes polarities and grounding rules.

The principle of electrolysis is the same as the principle that activates a battery, in that two metals submerged in an electrolyte or an acid create a current. A current flow will not be created if all grounds are kept at the same potential. However, if there is a grounded propeller and a hot sounder-transducer, current will flow between them, with water as the conductor. Current flows from the negative to the positive, taking with it microscopic pieces of metal, which are usually lost in the moving water.

electronic equipment is wired into the main panel, being carefully and correctly polarized. The radiohone and mechanical-drive portion of the automatic pilot must also be grounded.

2.1113

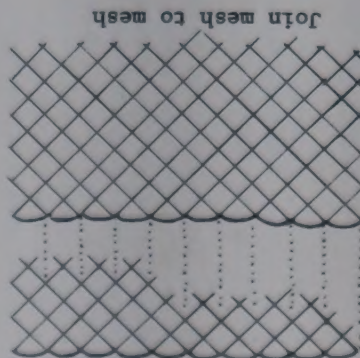
2.1112B
2 bars, 3 meshes, 2 bars, 4 meshes, 2 bars, 3 meshes, 2 bars, 4 meshes, etc., in the second example). Always cut full meshes parallel to the selvage edge.

3. Use the remaining wedge-shaped section at the opposite end of the seine. If a tapered section of netting is needed at only one end of the seine -

1. Spread the netting as before.
2. From one end of the lefthand edge, count 25 meshes to the right and begin your cut on the next half-mesh.

3. Continue cutting until you reach the right selvage edge. The wedge-shaped section thus severed will be about 12 fathoms long.

4. Turn the severed piece end over and upside down, and match the two 25-mesh-deep edges together.



C. Inserting the wedge

1. Selvage the cut tapered edge.
2. With the point of the wedge-shaped section as close as possible to the junction between bunt and body of the seine, lace the wedge between two adjacent strips of 4-in. mesh. Make sure that the same number of meshes appear on the tapered side as on the adjacent side. (Remember: 2 bars, 4 meshes.)
3. Lace the entire tapered section in without stopping. If you should have to stop, make a secure tie at the stopping point so the meshes cannot slip.

2.1112A

in 1 fathom (72 in. per fathom $\div$ 4 in. per mesh = 18 meshes) and 432 meshes along the horizontal edge of the proposed tapered section (18 meshes per fathom $\times$ 24 fathoms = 432 meshes). Rounded off, the edge of the wedge is 450 meshes long.

3. Check your calculations by stretching a piece of net along a 1-fathom rule and counting the meshes in a fathom. If the results of the count differ from those of your calculations, use the results of the count. This check will take care of variations caused by shrinkage or manufacturing irregularities.

4. Determine the proportion of vertical meshes to longitudinal meshes. In our example, the wedge is 50 meshes deep (MD) and 450 meshes long (ML), so the proportion is

$MD/ML = 50/450 = 1/9$. The numerator (1) represents the number of vertical meshes and the denominator the number of longitudinal meshes.

Thus, for every vertical mesh in the wedge, there will be 9 longitudinal meshes. However, since each cut will cross 2 bars (legs) of every mesh, the proportionate number of meshes must be converted to the proportionate number of bars in each unit mesh (81/2 bars of bars (2) bars (1) mesh).

5. From the formula denominator - numerator - that is, in each taper-making interval. In our example, the denominator is 18, the numerator is 2, so there are 16 meshes in each cutting unit. The complete unit is 2 bars, 8 full meshes. Repeating the 2-bar, 8-mesh cut until you reach the opposite selvage edge will give you a wedge-shaped section of net measuring about 42 fathoms long and tapering from 1 mesh at the narrow end to 25 meshes at the deep end.



2.117

NOVEL HIGH-PERFORMANCE EPOXY RESINS

Soldatos, A. C., and A. S. Burhans (Union Carbide Corporation, Bound Brook, New Jersey)
Industrial and Engineering Chemistry, Product Research and Development 6, No. 4, 205-209 (December 1967)

The development of high-strength filaments for use in reinforced structures has increased the need for epoxy resins of improved strength. To obtain the maximum potential of higher strength glass, boron, and carbon filaments, substantial improvements in the performance of epoxy matrices are necessary. The major objectives of the present investigation were: (1) the development of new types of epoxy resins with cast properties--such as compressive, flexural, and tensile--that are substantially higher than those of the commercial materials; and (2) the development of resin-hardener systems that can be used for the fabrication of practical reinforced structures. The reinforcements, preimpregnated with these systems, should be storage-stable and remain soft and tacky prior to curing.

To a large extent, these objectives have been met. Several resins with outstanding performance, both in cast properties and in composites, have been developed. Significant progress has been made toward the development of stable preimpregnated reinforcements. Some understanding of the chemistry of these resins has also been acquired.

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

2.12

NEW APPROACH TO THE ASSEMBLY OF CYLINDRICAL HULLS FROM SHELL SECTIONS

Stachiw, J. D.
Journal of Ocean Technology 2, No. 1, 50-52 (December 1967)

The customary method of fastening hulls assembled from cylindrical shells has been to join them with mechanical locks applied around the end sections. The method has many advantages, among which are the ease of sealing the joint with a single O-ring, the simplicity of machining the joint, the simplicity of locking the joint with either bolts or clamp bands, and the reliability of the circumferential joints thus formed. As long as the shell sections were produced by being sand cast, rolled, and welded; turned on a lathe from cylindrical forgings; or spun from laminated glass fiber, no other type of joint seemed to be critically needed. However, with the introduction of high-strength glass, ceramic, and alloy materials and the use of new forming techniques (such as explosion forging, die casting, and glass pressing), a more economical design was called for.

The cost of making semicylindrical shell sections by automatic processes is several times less than that of laboriously turning shells from thick-walled cylinders. Yet the author had to determine whether or not the automatically processed hulls were as strong in compression as the old monolithic ones are, whether longitudinal joints could be sealed, and whether the joint locks would be small enough to fit flush to the regular shell wall.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

NEW HIGH PERFORMANCE EPOXY RESINS

LONGITUDINALLY JOINED HULLS

2.41

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NEW SHIPPING CONTAINER DESIGNED TO KEEP FISH FRESH LONGER

Anonymous
U.S. Department of the Interior News Release, 1 p. (March 1, 1968) (U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D.C. 20240)

The shelf life and distribution range of fresh fishery products may be extended by use of a leakproof, nonreturnable, insulated container developed by the Bureau of Commercial Fisheries Technological Laboratory at Gloucester, Mass.

The containers can be easily handled and moved by one person. They lend themselves readily to the relatively small orders common in the fresh fish industry. The basic structure of the new container is a standard, corrugated, fiberboard box. A closable polyethylene bag is used as an interior lining to retain any drainage of the fish. Because the containers are leakproof, they can be shipped with cases of other frozen foods. Freezing or warming of the product is retarded by use of six slab inserts of equal size made of food-grade, 1½-inch-thick polystyrene. Fresh fish, prechilled to 33° F., are packed in the container and transported in "reefer" trucks, which are used to ship frozen foods.

Tests were conducted by shipping commercial quantities of fresh fish in the new containers from Boston to Chicago. The acceptable shelf life of these fish was 8 days, as compared with an average of 4 days for fish transported by the usual methods. After traveling nearly 1,000 miles at 0° F., the temperature of the fish was about 30° F. upon arrival.

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

3.63

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SOLVENT-DRYING: NEW FOOD-PRESERVING METHOD

Anonymous

Chemical Engineering 75, No. 4, 60, 62 (February 12, 1968)

A process has been developed that may extend the range of foodstuffs amenable to drying and reduce the cost of eliminating moisture from edibles. The process uses ethyl acetate as a solvent to form a minimum-boiling azeotrope with the water contained in the food. Ethyl acetate has been cleared by the Food and Drug Administration for use as a food additive. Following solvent removal, the ethyl acetate is present in permissible levels.

Such an azeotropic dehydration process has the following advantages over freezing as a method of food preservation: elimination of the water thwarts the action of spoiling agents; properly packaged dried foods can be shipped and stored anywhere without refrigeration; and the solvent-dried goods often look more appealing than frozen foods do.

The flavor, aroma, and nutritional value of foods can be thermally degraded if moisture is present in the final product. Vacuum freeze drying circumvents this problem by first freezing the food and then heating it to sublime off the water. However, the cost of vacuum freeze drying is greater than for freezing. It is understandable that vacuum freeze drying has only been commercially applied to high-cost items such as coffee and fruit. The azeotropic dehydration process does not require that the food be frozen. The ethyl acetate contacts the food and

*Item on back of card.

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

SHIPPING CONTAINER FOR FRESH FISH

SOLVENT DRYING FOR PRESERVING FOOD

British Patent 1,027,313
Abstracts from Current Scientific and Technical Literature 19, Abstract No. 1589,
p. 292 (June 1966)

A power-driven automatic machine for dressing the surfaces of irregular-shaped articles is described. It is said to be particularly suitable for dressing fish and meat.

2.41

The Regional Director of the Bureau of Commercial Fisheries said that packaging, handling, and freight costs for the new type of container appear to be lower than those for the wooden boxes currently in general use. Where freight costs exceed $2\frac{1}{2}$ cents per pound, the higher costs of the new packaging materials are recovered in freight savings. Gross weight of the filled containers, which require no ice, is from 30 to 50 percent less than the weight of filled wooden boxes, which require ice. The smaller gross weight would bring a substantial reduction in shipping costs, especially over long distances. Research is being continued to extend the possible marketing area of fish shipped in this manner from coast to coast.

An illustrated technical manuscript on the container and technical assistance on prechilling, packaging, and product characteristics are available from Laboratory Director, Bureau of Commercial Fisheries Technological Laboratory, Emerson Avenue, Gloucester, Mass. 01930.

Hosokawa, Kazuko, Yuriko Takai, Hiroyuki Iwao, Hisako Sawada, and Fuki Wada (Natl. Inst. Nutr., Tokyo, Japan)
Chemical Abstracts 66, No. 3, 10028x (January 16, 1967)

The dried and desolventized product rehydrates in 15 min., with well-maintained shape, color, flavor, and texture. In some cases, flavor and color components are extracted with the solvent, but these constituents can be recovered. It is estimated that foods can be dried for about 3 cents per pound in a 40,000-ton feed-per-year plant. Conventional freeze-drying costs range upwards from 15 cents per pound.

Solvent penetration accelerates the rate of water diffusion. Drying cycle times appear to be about 45 min., and large chunks of food can be dehydrated. Because ethyl acetate has only about one-fifth the volumetric latent heat of vaporization of water, heat requirements for the removal of residual solvent are substantially reduced as compared with those for eliminating a similar volume of water.

3.63

2.117 (Cross Reference: 2.116, 2.149)

FISHING WITH NO HANDS

Anonymous
New Scientist 35, No. 558, 328 (August 17, 1967)

Russia's powered fishing fleet has more than trebled in the past 25 years. Now her scientists and engineers are designing vessels that need no crews. Controlled from a mother ship some miles away, these vessels will be of various sizes. The smaller ones will be electronically equipped to detect fish at depths of up to 1,000 feet; the larger ones, at depths of up to 2,500 feet.

[Abstracter: L. Baldwin]

To make this determination, he built three acrylic resin models and subjected them to hydrostatic pressure. One model had a rib-stiffened hull that was assembled from two semicylindrical sections capped at the ends with hemispherical and conical closures and fastened with a continuous O-ring harness and a series of cam-stud locking devices. This model proved that such a hull had no less depth of capability and weighed no more than does a hull assembled and joined in the customary manner. The smooth performance of the cam-stud locks, the ease of fabricating the semicylindrical sections, the unrestricted access to the vehicle's interior (necessary for maintenance and retrieval of recorded data), and the compressive strength of the finished hull make the vehicle a desirable type of underwater structure.

2.12 (Cross Reference: 9.11)

2.117

4.11	CORRELATION OF FATTY ACID STRUCTURE WITH PREFERENTIAL ORDER OF UREA COMPLEX FORMATION	Iverson, John L., and R. W. Weik (Division of Food Standards and Additives, Food and Drug Administration, Washington, D.C. 20204) Journal of the Association of Official Analytical Chemists <u>50</u> , No. 5, 1111-1118 (October 1967)	The preferential order in which fatty acids are selectively removed from a solution by forming urea complexes should be known if a fatty acid present in trace amounts in a complex mixture is to be identified. Identification of trace amounts of fatty acids by retention times alone is not conclusive and must be based on methods that indicate a particular structure. This report illustrates the concentrations and separations obtained when a standard fractionation procedure is applied to a complex mixture of fatty acids. The practical advantages and limitations of the methods for use with complex biological mixtures are emphasized, and these points are demonstrated with complex oils such as marine oils. The value of detailed knowledge of the preferential order in which inclusion compounds are formed for indicating a particular fatty acid for a particular gas-liquid chromatography (GLC) peak is illustrated.	The selective order in which methyl esters of fatty acids form urea complexes was correlated with the structure of the fatty acid. Detailed information on the preferential order in which inclusion compounds are formed was obtained by fractionating complex oils, such as cod-liver oil. The preferential (over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: M. F. Tripple
4.12	CORRELATION OF FATTY ACID STRUCTURE WITH PREFERENTIAL ORDER OF UREA COMPLEX FORMATION	Iverson, John L., and R. W. Weik (Division of Food Standards and Additives, Food and Drug Administration, Washington, D.C. 20204) Journal of the Association of Official Analytical Chemists <u>50</u> , No. 5, 1111-1118 (October 1967)	The preferential order in which fatty acids are selectively removed from a solution by forming urea complexes should be known if a fatty acid present in trace amounts in a complex mixture is to be identified. Identification of trace amounts of fatty acids by retention times alone is not conclusive and must be based on methods that indicate a particular structure. This report illustrates the concentrations and separations obtained when a standard fractionation procedure is applied to a complex mixture of fatty acids. The practical advantages and limitations of the methods for use with complex biological mixtures are emphasized, and these points are demonstrated with complex oils such as marine oils. The value of detailed knowledge of the preferential order in which inclusion compounds are formed for indicating a particular fatty acid for a particular gas-liquid chromatography (GLC) peak is illustrated.	The selective order in which methyl esters of fatty acids form urea complexes was correlated with the structure of the fatty acid. Detailed information on the preferential order in which inclusion compounds are formed was obtained by fractionating complex oils, such as cod-liver oil. The preferential (over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: M. F. Tripple
4.21	SULFUR DICHLORIDE DIADDUCTS OF UNSATURATED FATTY DERIVATIVES. I - PREPARATION AND OXIDATION	Grimm, Robert A. (T. L. Daniels Research Center, Archer Daniels Midland Company, Bloomington, Minnesota) Journal of the American Oil Chemists' Society <u>44</u> , No. 10, 563-566 (October 1967)	The author expresses a twofold interest in the reaction of sulfur dichloride with fatty derivatives. Since sulfur dichloride was the simplest of the compounds of sulfur and chlorine, he thought it offered the best chance of forming simple, well-defined products with unsaturated fatty materials. He also wanted to study some of the reaction variables to learn if the reaction could be controlled to give well-defined adducts. Simple sulfur dichloride-olefin diadducts, β,β' -dichlorides, undergo reactions with nucleophiles more readily than the corresponding alkyl halides do. Since fatty chlorides in which the chloride group is near the center of the chain undergo substitution reactions poorly, he thought the sulfur dichloride adduct might provide a fatty material with internal chlorine atoms susceptible to reaction with nucleophiles. Accordingly, the author studied the preparation of the sulfur dichloride adducts of oleate and elaidate esters, oleylnitrile and linoleate esters. He also studied the adducts formed from <i>cis</i> -2-butene and <i>trans</i> -2-butene as models for oleate and elaidate, respectively.	Sulfur dichloride diadducts of oleate esters, oleylnitrile, elaidate esters, and ethyl linoleate were prepared by adding the theoretical amount of sulfur (over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: M. F. Tripple
4.21	SULFUR DICHLORIDE DIADDUCTS OF UNSATURATED FATTY DERIVATIVES. II - REACTION WITH NUCLEOPHILES	Grimm, Robert A. (T. L. Daniels Research Center, Archer Daniels Midland Company, Bloomington, Minnesota) Journal of the American Oil Chemists' Society <u>44</u> , No. 10, 567-571 (October 1967)	The results of studies on the reaction of sulfur dichloride-oleate diadducts with some nucleophiles are reported. The author wanted to find an efficient and economical way to introduce reactive groups into the chain of a fatty molecule and thought that the sulfur dichloride-oleate diadducts (β,β' -dichlorosulfide diesters) might be suitable for this purpose. The hydrolysis and ammonolysis of the sulfur dichloride diadducts of <i>cis</i> and <i>trans</i> -2-butene were studied because the author expected that these compounds would be models of oleate and elaidate but would be easier to purify and work with than the original compounds would.	The chloro groups in the bis-9(10)-[alkyl-10(9)-chlorooctadecanoate]-sulfides described in Part I reacted with water, alcohols, ammonia, amines, cyanides, cyanates, thiocyanates, and azides. The rates of these reactions were so rapid that the chloro groups were completely replaced before significant attack on the ester group occurred. The products of these reactions without exception were the open-chain disubstituted-sulfide diesters, such as bis-9(10)-[ethyl-10(9)-aminooctadecanoate]-sulfide. No evidence was found for cyclic structures, such as thiomorpholine. The sulfur dichloride diadducts from <i>cis</i> -2-butene and <i>trans</i> -2-butene (over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: M. F. Tripple
4.13	CONVERSION OF A DIETARY TRIGLYCERIDE INTO DEPOT FAT IN FISH AND LOBSTER	Brockerhoff, H., and R. J. Hoyle (Halifax Laboratory, Fisheries Research Board of Canada, Halifax, Nova Scotia) Canadian Journal of Biochemistry <u>45</u> , No. 9, 1365-1370 (September 1967)	Four cods (<i>Gadus morhua</i>), two speckled trouts (<i>Salvelinus fontinalis</i>), and four lobsters (<i>Homarus americanus</i>) were fed a triglyceride that contained oleic-9, 10-3H acid in the β position and oleic-1-14C in the α position. Cods No. 1 and 2 were females that were fed labeled triglyceride 6 days before being killed, cod No. 3 was a male that was fed 18 days before being killed, and cod No. 4 was a female that was killed after being fed for 31 days. Trout No. 1 was killed after 7 days and Trout 2 after 21 days of feeding. Lobsters Nos. 1, 2, 3, and 4 were killed after 3, 5, 7, and 11 days, respectively, of feeding.	After the fish were killed, the distribution of the labels in the α and β positions of the depot fat was analyzed (see Table on back of card). Since the original distribution was largely retained in the lobster, the β -monoglyceride structure of the dietary fat was presumably retained. 3H in the fish apparently was partially retained in the β position, whereas the 14C of the originally α -bound acids was distributed almost at random. The authors conclude that these results support the hypothesis that fish partly retain the β -monoglyceride structure of dietary fat. They found, however, that the larger part of the fat in fish, (over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: L. Baldwin
4.13	CONVERSION OF A DIETARY TRIGLYCERIDE INTO DEPOT FAT IN FISH AND LOBSTER	Brockerhoff, H., and R. J. Hoyle (Halifax Laboratory, Fisheries Research Board of Canada, Halifax, Nova Scotia) Canadian Journal of Biochemistry <u>45</u> , No. 9, 1365-1370 (September 1967)	Four cods (<i>Gadus morhua</i>), two speckled trouts (<i>Salvelinus fontinalis</i>), and four lobsters (<i>Homarus americanus</i>) were fed a triglyceride that contained oleic-9, 10-3H acid in the β position and oleic-1-14C in the α position. Cods No. 1 and 2 were females that were fed labeled triglyceride 6 days before being killed, cod No. 3 was a male that was fed 18 days before being killed, and cod No. 4 was a female that was killed after being fed for 31 days. Trout No. 1 was killed after 7 days and Trout 2 after 21 days of feeding. Lobsters Nos. 1, 2, 3, and 4 were killed after 3, 5, 7, and 11 days, respectively, of feeding.	After the fish were killed, the distribution of the labels in the α and β positions of the depot fat was analyzed (see Table on back of card). Since the original distribution was largely retained in the lobster, the β -monoglyceride structure of the dietary fat was presumably retained. 3H in the fish apparently was partially retained in the β position, whereas the 14C of the originally α -bound acids was distributed almost at random. The authors conclude that these results support the hypothesis that fish partly retain the β -monoglyceride structure of dietary fat. They found, however, that the larger part of the fat in fish, (over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: L. Baldwin
4.13	FATTY ACID STRUCTURE AND UREA COMPLEX FORMATION CONVERSION OF DIETARY TRIGLYCERIDE INTO DEPOT FAT IN FISH					

4.91
(*)

INCORPORATION OF FATTY ACIDS OF MARINE ORIGIN
INTO TRIGLYCERIDES AND PHOSPHOLIPIDS OF MAMMALS

Brockerhoff, H., R. J. Hoyle, and P. C. Hwang (Fisheries Research Board of Canada
Halifax Laboratory, Halifax, Nova Scotia)
Biochimica et Biophysica Acta, Lipids and Lipid Metabolism 144, No. 3, 541-548
(December 5, 1967)

The distribution of fatty acids over the different positions of glycerol in phospholipids and triglycerides is decidedly not random. Saturated acids occupy Position 1 in phospholipids, and polyenoic acids occupy Position 2. There is a similar preference of polyenoic acids for Position 2 in triglycerides. The linoleic acid of mammals and the acids 20:5 and 22:6 of marine fish and invertebrates prefer Position 2 in triglycerides. Therefore, it is surprising that in seal oil, which contains 20:5, 22:5, and 22:6 rather than 18:2, these acids are found accumulated in Position 3. Because the same distribution has been found in a whale and in a polar bear, the authors suspected that this pattern might be a general one for all mammals eating marine fats.

Rats and mink were fed a diet of mackerel for 5 weeks, at which time the animals were sacrificed and the distribution of fatty acids over the different positions of triglycerides and phospholipids was analyzed.

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*Item on back of card.

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ABSTRACTER: M. F. Tripple

6.131
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12 GREAT JAPANESE TRAWLERS
INSTALL SWEDISH CENTRIFUGAL SYSTEM

Sakai, Kenji
Ocean Fisheries 4, No. 1, 19-20 (January 1968)

Twelve vessels of the Japanese distant-water trawl fleet have been equipped with a new type of reduction unit. Each unit has a daily capacity of 50 metric tons of raw material, which includes unmarketable whole fish and waste from on-board fish preparation. The new reduction system differs markedly from more conventional technologies in that it employs centrifugal force for pressing the cooked material, thereby eliminating mechanical pressing.

For various reasons, the centrifugal equipment has been found particularly suited to fishing-vessel installation. The equipment is light and compact because the heavy press machinery and boilers have been eliminated. The layout of the equipment can conform to limited available space. The centrifugal system gives a high recovery of meal with a low oil content. The system is economical of fuel and water, and requires a small number of operating personnel.

The centrifugal system of fish reduction depends upon close control of the cooking of the raw material. The cooking is followed by recovery of gross solids in a decanter type of horizontal centrifuge, from which they go to the indirect heat dryer. The liquid emulsion flows through a heat exchanger where it is brought to optimum temperature. The emulsion then goes to a self-cleaning

*Item on back of card.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

INCORPORATION OF MARINE FATTY ACIDS INTO MAMMALIAN LIPIDS

SWEDISH CENTRIFUGAL REDUCTION SYSTEM

6.14

STUDIES ON INFLUENCE OF RAYS UPON FILM-PACKAGING
IV - DISCOLORATION OF THE FILM-PACKED "SAKURA-DEMBU"
WRAPPED WITH CELLOPHANE OF DIFFERENT COLORS

Watanabe, Wataru, Akira Kobayashi, Toshiaki Hisasue, and Hiroshi Kawakita (Research Laboratory, Niko Co., Ltd., 7-4 Ginza Higashi Chuo, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 10, 956-961
(October 1967)

In 1966, the authors determined that "sakura-dembu" (seasoned cod meal) was not protected from discoloration by being packed in transparent films that were permeable to oxygen or ultraviolet rays. In this report, they investigate the protective effect of different-colored cellophanes.

Color of Cellophane	Transmission rate	
	Indoors (1 p.m.)	outdoors (noon)
Colorless	90-100	95-100
Yellow	75-80	80-90
Orange	65-70	70-75
Red	15-20	30-40
Green	15-20	25-30

Each sample was packed in laminated polyethylene and then overwrapped with one of five different-colored cellophane materials: colorless (for control), red, orange, yellow, and green. The samples were then stored for 1 month under natural light at room temperature. The transmission rate of the light through the different colors is shown on the left. The values for the color differences (ΔE) are plotted on the back of the card.

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ABSTRACTER: L. Baldwin

7.51

STUDIES ON THE NORTH SEA COD
V - EFFECTS OF STARVATION.

3. ELECTROPHORESIS OF THE MUSCLE MYOGENS

Robertson, I., R. M. Love (Torry Research Station, Aberdeen, Scotland); and
W. P. Cowie (Unilever Research Laboratory (Colworth), Greyhope Road, Aberdeen, Scotland)

Journal of the Science of Food and Agriculture 18, No. 12, 563-565 (December 1967)

In the previous paper in this series (Love and Robertson, 1967), the authors showed that the proportion of cod muscle proteins, both soluble and insoluble in 5 percent NaCl, varied markedly during the course of starvation. However, no study has been made of the electrophoretic patterns given by the myogens of fish of controlled nutritional status. In 1953, Connell showed that the electrophoretic patterns of various species of fish were different; since that time investigators have shown similar effects with more modern equipment. Of importance is the possibility of distinguishing between local races or stocks of the same fish species. While electrophoresis of the hemoglobins is at present more promising for this distinction, electrophoresis of the muscle myogens has been known to give useful information. Therefore, the authors felt it was important to study the electrophoretic patterns of muscle myogens from fish starved for 11 weeks to establish if starvation had any marked influence on these patterns.

The water content of the fish muscle rose without interruption after the 7th week of starvation. Love (1967) has suggested that water content rises and

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 11
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

DISCOLORATION OF CELLOPHANE-WRAPPED COD MEAL

ELECTROPHORESIS OF MYOGENS FROM STARVED COD

6.131 (Cross Reference: 2.1118)

centrifuge, which produces a clean oil, fine solids for the dryer, and stickwater. If the vessel is equipped for it, the stickwater may be further condensed.

The reason the Japanese installed the centrifuge plants in the trawlers was the complete utilization of the fish resources. The Japanese produce frozen dressed fish and fillets on their trawlers. The waste from these operations is immediately used to produce salable products of high quality. The unmarketable fish caught by the Japanese nets can be used for reduction products. The Japanese found that the plants could be installed readily aboard ship and operated effectively under sea conditions.

A method for the hydrolysis of fish meat with papain gave an overall recovery of 8 percent by weight of the whole fish when *Barbus dubius*, a fresh-water fish, was used.

[Extractor: L. Baldwin]

World Fisheries Abstracts 17, No. 2, 39-40 (April-June 1966)

6.130 PREPARATION OF PROTEIN HYDROLYZATES FROM FISH MEAL

Stripathy, N. V., D. P. Sen, and N. L. Lahiry

Res. Ind. (New Delhi, India) 9, No. 9, 258-260 (1964)

The triglycerides of depot fat; the polyenoic acids accumulated in Positions 1 and 3 in the pattern was similar to that of marine mammals. The triglycerides of the depot fats did.

In the phosphatidyl-choline and phosphatidyl-ethanolamine of the livers of mink and rat and of the adipose tissue of rat, the acids 20:5 and 22:6 were incorporated into the α -position, replacing linoleic and arachidonic acid. The fatty acid composition in the α -position remained unchanged. There was little incorporation of 20:1 and no noticeable accumulation of 14:0, 16:1, 18:4, and 22:2 in the phospholipids.

It would seem that marine fatty acids can be accepted by depot fat for the purpose of energy storage; however, they do not serve other structural or metabolic purposes. An exception is the long-chain polyenoic acids, especially 22:6. [12 references]

Burgess, Joyce T. (Univ. of Arkansas, Fayetteville, Arkansas)
Chemical Abstracts 64, 11618a (April 11, 1966)

4.91 EFFECTS OF SATURATED AND UNSATURATED LONG-CHAIN FATTY ACIDS FED WITH AND WITHOUT ESSENTIAL FATTY ACID ON VARIOUS COMPONENTS OF LIPID AND CARBOHYDRATE METABOLISM

protein falls after muscle carbohydrates can no longer be maintained by the mobilization of glycogen reserves in the liver. During this study, insoluble-nitrogen peaked for the first time after 2 weeks, and then again after 10 weeks; total protein reached a maximum after 4 weeks, and water content started to increase after 7 weeks of starvation. Any changes in the electrophoretic patterns might be expected to occur at one or more of these times.

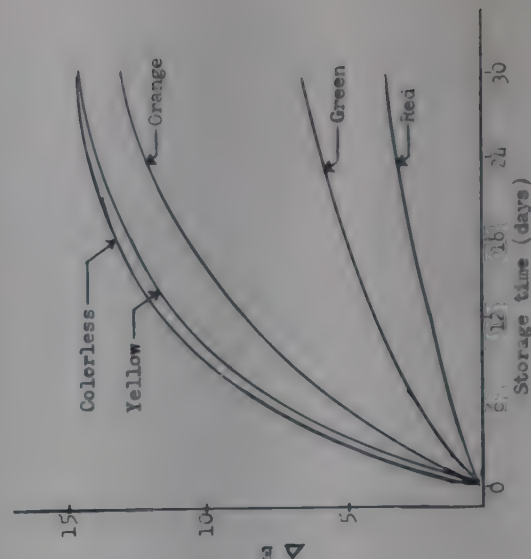
Muscle samples from every stage of starvation were stored and subjected to electrophoresis at the same time. On the whole, there were no differences between the patterns, but the upper bands of the pattern were fainter after 8 weeks of starvation than at any other time. Some of the results also indicated that the two lowest bands became fainter as starvation progressed, but this was not seen in every case. No new bands appeared during the 11 weeks of starvation, nor did the migrating speed of existing bands change.

Because changes in the extractability of the fibrillar protein during starvation presumably reflect changes in the molecular configuration prior to mobilization, it was surprising that no evidence of breakdown products appeared as extra bands in the electropherograms. Possibly the amino acids were split off singly and were then metabolized.

The most important conclusion from this work is that the patterns obtained by the electrophoresis of extracts of cod muscle are essentially unchanged, although the nutritional conditions are changed. This finding will be of value when different species or races of fish are being identified by electrophoresis. [11 references]

6.114

Other samples were wrapped in the same manner but were irradiated for 1.5 hours with ultraviolet rays from a fade meter. Discoloration of these samples was of the same order and tendency as that of the samples stored under natural conditions. Therefore, the authors concluded that discoloration of such products as seasoned cod meal can be evaluated as well by short-time irradiation with ultraviolet rays as by long-term storage under natural conditions.



7.80 (*)	HYPOXANTHINE IN ICED FRESHWATER FISH Dugal, L. C. (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba, Canada) Journal of the Fisheries Research Board of Canada 24, No. 11, 2229-2239 (November 1967)	7.83	CHEMICAL STUDIES ON THE HERRING (CLUPEA HARENGUS) XI - QUANTITATIVE ESTIMATION OF VOLATILE SULPHUR COMPOUNDS PRODUCED DURING THE COOKING OF HERRING McLay, R. (Torry Research Station, Ministry of Technology, Aberdeen, Scotland) Journal of the Science of Food and Agriculture 18, No. 12, 605-607 (December 1967)
The aims of this investigation were to determine the rate of hypoxanthine formation in the muscle of fresh-water fish during iced storage and to assess the value of the hypoxanthine test as an index of freshness. The formation of hypoxanthine was followed in a sufficient number of individual fish to obtain data of statistical significance. The two species of fish used in this study were yellow walleye (<i>Stizostedion vitreum</i>) and whitefish (<i>Coregonus clupeaformis</i>). The formation of hypoxanthine in the dorsal muscle was followed in 36 yellow walleye and in 22 whitefish stored in ice for different lengths of time. At the fishes' death, the average hypoxanthine content of 0.25 μmole per gram was about the same for the two species. The hypoxanthine content in walleye increased gradually to 1.52 μmole per g. in 22 days and in whitefish to 2.54 μmole per g. in 19 days. Hypoxanthine values of this magnitude would normally lead to the rejection of the fish as a group. The average rate of hypoxanthine formation in yellow walleye was 0.06 μmole per g. per day, which was the same as in the muscle of swordfish. The rate of formation in whitefish was 0.13 μmole per g. per day, which was slightly higher than that of Atlantic salmon but lower than that of *Item on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE		Hughes (1964) demonstrated the presence of hydrogen sulfide, methyl mercaptan, and dimethyl sulfide in the volatile gas that is produced during the cooking of herring. Hughes cooked the herring at atmospheric pressure for 1 hour and collected the volatiles by a cold-trap technique. Since the object of the present work was to quantitatively study the production of volatile sulfur compounds in canned herring, an attempt was made to adapt the technique of Hughes to avoid further cooking of the fish. This adaptation proved difficult to do, and, although the volatile sulfur compounds were identified by gas-liquid chromatography, the results were not quantitatively reproducible. Consequently, a method consisting of an absorption train of bismuth nitrate, mercuric cyanide, and mercuric chloride to trap hydrogen sulfide, methyl mercaptan, and dimethyl sulfide, respectively, was tried. The entire amount of trapping solution was used in each case for the colorimetric determination of the volatile sulfur compounds with N,N-dimethyl-p-phenylenediamine. The difference between the dimethyl sulfide contents of raw nobbed (beheaded and eviscerated) herring and raw filleted herring was insignificant. The dimethyl sulfide was reduced by up to 50 percent when the fish were canned. The filleted (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	
7.80	NEW TESTS ASSESS QUALITY CHANGES IN FISH Spinelli, John (Bureau of Commercial Fisheries Technological Laboratory, Seattle, Washington 98102) Commercial Fisheries Review 29, No. 11, 69-70 (November 1967) (Separate No. 801)	7.871	THE INHIBITED AUTOXIDATION OF STYRENE. PART VII - INHIBITION BY NITROXIDES AND HYDROXYLAMINES Brownlie, I. T. (Canadian Celanese, Drummondville, Quebec), and K. U. Ingold (Division of Applied Chemistry, National Research Council of Canada, Ottawa) Canadian Journal of Chemistry 45, No. 20, 2427-2432 (October 15, 1967)
A freshly caught fish has a subtle and attractive flavor that is gradually lost as the fish ages. Because a fish will spoil rapidly, these flavor changes have been associated with bacterial growth. For years, fresh and frozen fish were evaluated by sensory or objective tests based on the detection of the end products produced by growing bacteria. Although these tests are useful, they fail to detect the more subtle changes in quality that are closely related to the acceptability of fish. Recent studies of certain biological changes that occur in fish post mortem have resulted in important contributions to the measurement of quality and to understanding the chemical reactions that lead to loss of quality. After a fish dies, a class of chemical compounds in the flesh known as nucleotides is gradually broken down into simpler chemical constituents. During iced storage, the nucleotides break down at a fairly rapid rate. The measurement of either the remaining nucleotides in the flesh, or their breakdown products, provides a basis for establishing the time the fish has been held. The degradation of nucleotides is also involved in the changing flavor characteristics of fish flesh. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE		An important development in the understanding of the inhibition of oxidation by amines was the discovery by Thomas et al. (1957, 1960, 1961) that relatively stable diaryl nitric oxide radicals (nitroxides) are produced in fairly high concentrations during inhibition with diarylamines. The reaction that occurs is $A^{\cdot} + RO_2^{\cdot} \rightarrow AO^{\cdot} + RO^{\cdot}$; a similar reaction occurs with dialkyl amines. Interest in the inhibition of oxidation by stable aliphatic and aromatic nitroxides has been considerable. Diphenyl nitroxide stops about half as many oxidation chains as does the parent amine. Recent results by Russian investigators have suggested that aliphatic nitroxides react with alkyl radicals ($R^{\cdot}$) but not with peroxy radicals ($RO_2^{\cdot}$), whereas aromatic nitroxides react with both types of radicals. The inhibition of oxidation by hydroxylamines has received little attention. This paper describes the inhibition of the oxidation of styrene by an aliphatic nitroxide, two aromatic nitroxides, the hydroxylamines derived from these radicals, and N,N'-diphenyl-p-quinonediimine-N,N'-dioxide. Unusual oxidation behavior was seen with styrene that contained 4,4'-dinitrodiphenyl hydroxylamine. *Item on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	
HYPOXANTHINE FORMATION IN ICED FRESH-WATER FISH ASSESSING QUALITY CHANGES IN FISH COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE		VOLATILE SULFUR COMPOUNDS PRODUCED IN CANNED HERRING INHIBITED AUTOXIDATION OF STYRENE ABSTRACTER: M. F. Tripple	

The key to understanding this degradation process lies in a knowledge of the parent nucleotide, known as adenosine triphosphate (ATP). ATP is a combination of two compounds, adenine and ribose, and of three phosphate molecules. ATP provides the essential fuel in living tissue for a series of life processes. In doing so, ATP is constantly being broken down and regenerated. After death, the ATP is no longer regenerated, and it quickly goes through a sequence of reductions to the smaller molecules, adenosine diphosphate (ADP), adenosine monophosphate (AMP), and finally inosine monophosphate (IMP). The IMP slowly breaks down to inosine, and then to hypoxanthine, ribose, and phosphate. The rates at which degradation occurs differ for different species of fish, so these rates must be experimentally determined to derive useful information from the measurement of nucleotides, or their degradation products. The rates of nucleotides' degradation for practically all commercially important species of fish have been published.

The work on nucleotides has provided insight into the chemistry of fish flavor. IMP not only is a flavor compound, it also enhances the flavors of other compounds. It has been noted that buyers continually pay higher prices for tuna with high IMP content than for tuna with low IMP content. Losses in flavor closely parallel the loss of IMP, and fish containing IMP above its threshold level (the level at which IMP can barely be tasted) are definitely preferred to fish containing less than this amount. Higher flavor ratings are given to fish that have been treated to prevent degradation of fish than to fish that have not been similarly treated.

The rate of hypoxanthine formation varied widely between individual yellow walleyes. The average hypoxanthine content of groups of yellow walleyes and whitefish was found to be proportional to the number of days in storage. No difference in average rate of hypoxanthine formation was noticed between fillets taken from opposite sides of the whitefish, nor between fresh and thawed fish.

The fact that hypoxanthine is formed at different levels in different individuals within a species would preclude using the level of hypoxanthine as an index of quality for individual fish. According to the results thus obtained, however, there is a strong possibility that the average hypoxanthine content of a group of fish would reflect the true state of freshness of that particular group. Because the rate of hypoxanthine formation varies from species to species, the species rates would first have to be determined, taking into account the possibility that the rates could differ in groups from different geographic areas or of different physiological states at different times of the year. The author concludes that hypoxanthine content appears to be a suitable index of freshness for groups of fish but not for individual fish. [2] references

EVALUATION OF CHEMICAL TESTS FOR THE QUALITY OF PRAMS

7.8

Shakhsan, Fatima, and N. G. Nagar (Inst. Sci., Bombay, India)
Chemical Abstracts 66, No. 23, 104120t (June 5, 1967)

7.871 (Cross Reference: 3.238)

The inhibition of the oxidation of styrene by the stable aliphatic nitroxide radical 2,2,6,6-tetramethyl-4-piperidone nitroxide (and two stable aromatic nitroxide radicals 2,2,6,6-tetramethyl-4-piperidone nitroxide and 4,4'-dinitrodiphenyl nitroxide) was investigated. The aromatic nitroxides reacted with both alkyl (R) and peroxy (RO₂) radicals; the aliphatic nitroxide reacted only with alkyl radicals. The hydroxylamines derived from 2,2,6,6-tetramethyl-4-piperidone nitroxide and from 4,4'-dinitrodiphenyl nitroxide reacted only with peroxy radicals. These hydroxylamines were quite effective as oxidation inhibitors and exhibited a deuterium kinetic isotope effect of $k_H/k_D = 2-3$. The hydroxylamine from 4,4'-dinitrodiphenyl nitroxide inhibited the oxidation of styrene for a short time and then became a powerful oxidation catalyst. A product from this hydroxylamine possibly underwent a rapid chain-branching reaction with styrene.

The authors concluded that neither nitroxides nor hydroxylamines are likely to play an important role as commercial antioxidants. The hydroxylamines derived from 2,2,6,6-tetramethyl-4-piperidone nitroxide and 4,4'-dinitrodiphenyl nitroxide are not significantly more reactive towards peroxy radicals than are the better amines and phenolic inhibitors. The hydroxylamines also suffer the disadvantage of being less stable towards the normal products of hydrocarbon oxidation than are most amines and phenols. Certain nitroxides may be useful as polymerization inhibitors. [25 references]

Chemical Abstracts 67, No. 23, 107471q (December 4, 1967)

Leng, Alfonso, Ulises Sanchez, Juan Grawen, R. Contreras, and Rene Vasquez (Escuela Dental Univ., Chile, Santiago, Chile)

SPECTROGRAPHIC DETECTION OF STRONTIUM, MOLYBDENUM, AND VANADIUM IN FISH FLOURS, FISH MEALS, AND BONE MEALS

7.89

7.87

herring contained less hydrogen sulfide than the nobbed herring did. The hydrogen sulfide content of the nobbed herring did not change when the herring was canned, whereas the hydrogen sulfide content of the fillets decreased by about 90 percent when they were canned. The methyl mercaptan content of fillets with skin was about twice that of the nobbed herring and three times that of fillets without skin. When the fish was canned, the methyl mercaptan content of nobbed herring increased slightly, the content of the fillets without skin decreased by about 50 percent, and that of fillets with skin decreased by about 65 percent.

The parts of the fish that are removed during filleting appear to be richer in hydrogen sulfide or its precursors than is the fillet, and the skin appears to produce relatively large amounts of methyl mercaptan. There is, however, a decrease in the total volatile sulfur compounds in herring after it has been canned, so the authors do not believe that sulfur compounds play a significant role in producing off-flavors during the canning process. Nevertheless, there is a significant difference between the volatile sulfur contents of canned nobbed herring and canned fillets, particularly fillets without skin. Heated fish muscle appears to release volatile sulfur compounds less readily than the rest of the fish does. The glucose present in heated herring flesh may participate in a degradation of methionine to produce methyl mercaptan and dimethyl sulfide. During the canning of fillets, it is possible that more leaching of glucose and methionine may occur. This leaching might produce an explanation of the difference between the volatile sulfur contents of canned nobbed fish and canned fillets. Losses of volatile sulfur compounds before the cans are sealed and autoclaved may explain the decrease in volatile sulfur compounds after canning, since the production of volatile sulfur compounds was found to be greatest during the first 30 minutes of cooking and usually to cease after 45 minutes.

8.59
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PROPERTIES OF THE CRUSTACYANINS
AND THE YELLOW LOBSTER SHELL PIGMENT

Buchwald, Manuel, and William P. Jencks (Graduate Department of Biochemistry, Brandeis University, Waltham, Massachusetts 02154)
Biochemistry 1, No. 2, 844-859 (February 1968)

This report concerns the physical, chemical, and optical properties of the carotenoid-protein lobster shell pigments--the crustacyanins and an unnamed yellow shell pigment. In their denatured state, these pigments are responsible for the red color of the boiled lobster.

The minimum molecular weight of the astaxanthin-protein pigment, β -crustacyanin, is 21,800 $\pm$ 1,000; α -crustacyanin and a new pigment, γ -crustacyanin, have similar weights. The minimum molecular weight of the unnamed yellow shell pigment is 4,400. The molecular weights of β -crustacyanin, α -crustacyanin, and γ -crustacyanin are 48,000 $\pm$ 5,000, 380,000 $\pm$ 40,000, and 400,000 $\pm$ 40,000, respectively; the molecular weight of the yellow pigment is 90,000 $\pm$ 10,000. These figures indicate that β -crustacyanin contains two molecules of astaxanthin and suggest that α -crustacyanin is composed of eight subunits equivalent to β -crustacyanin.

The extinction coefficient, oscillator strength, and shape of the absorption bands of the three crustacyanins and of astaxanthin are almost identical. This fact suggests that the energy, but not the nature, of the electronic transition (over)

*Item on back of card.

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

8.59
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STUDIES ON CHITINOLYTIC ENZYME PRESENT IN AQUATIC ANIMALS.
V - THE CHITINOLYTIC ENZYME PRESENT
IN THE DIGESTIVE TRACT OF YELLOW TAIL

Okutani, Koichi (Dept. of Fish., Fac. of Agr., Kinki Univ., Osaka, Japan); Izumi Kawada (Res. Inst. Food Sci., Kyoto Univ., Kyoto, Japan); and Masao Kimata (Dept. of Fish., Fac. of Agr., Kyoto Univ., Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 9, 848-852 (September 1967)(In Japanese; English summary)

In 1964, the authors reported that some of the organs of a few kinds of aquatic animals contain a chitinolytic enzyme. Okutani (1966) found that the chitin in the digestive tract of Japanese sea bass, *Lateolabrax japonicus*, is apparently decomposed simultaneously by both bacterial and nonbacterial actions. The present study was made to determine whether similar chitinolytic actions occur in yellowtail, *Seriola quinqueradiata*.

The results of the study are as follows:

1. A nonbacterial enzyme of high chitinolytic activity is present in the stomach but not in the pyloric ceca or the intestine of yellowtail. This enzyme is stable at pH 3-4 at 22° C. for at least 24 hr.; the optimum pH for its action is about 4 and the optimum temperature about 50° C.

2. Nearly all the bacteria in the intestine and about one-third those in the stomach are chitin-decomposing bacteria. The optimum pH for the action of the bacterial enzyme is about 7 and the optimum temperature about 40° C.

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

8.8

STUDIES ON THE DISCOLORATION OF RED FISHES
IV - DISCOLORATION OF ASTAXANTHIN, TUNAXANTHIN,
AND β -CAROTENE BY THE TISSUE HOMOGENATES OF FISHES

Tsukuda, Nobuo, and Keishi Amano (Tokai Regional Fisheries Research Laboratory, 5-5 Kachidoki, Chuo-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 10, 962-969 (October 1967)

The major pigments of red fishes, including fishes with red spots or stripes on the skin and fin, are astaxanthin, other yellow carotenoids, and melanoids. Because the tissues of red fishes contain large amounts of astaxanthin and tunaxanthin, color-fading during storage can be attributed to the loss of carotenoid pigments. Although heat and sunlight have an appreciable effect on the bleaching of skin color (Tsukuda and Amano, 1966), discoloration also occurs at refrigerated temperatures in perfect darkness. To investigate the biological agents, other than light and atmospheric oxygen, that may affect discoloration, the authors examined aqueous extracts of skin, muscle, and liver in terms of their ability to convert astaxanthin, tunaxanthin, and β -carotene into colorless substances.

Skin homogenates rapidly discolored astaxanthin in 18 fishes (see table on back of card for examples) and tunaxanthin and β -carotene in others; liver homogenates were slightly less effective; muscle homogenates had no effect on astaxanthin or tunaxanthin, but it did discolor the β -carotene in *Chelidonichthys kumu* and *Lepidotrigla aspera*. The skin homogenates of *Epinephelus akaara* caused quick (over)

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: L. Baldwin

9.11
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WHO OWNS THE OCEAN FLOOR?

Anonymous

Chemical Week 101, No. 15, 5 (October 7, 1967)

It is the opinion of the author that although ownership, or control, of the ocean floor is largely a theoretical problem at the present time, in the foreseeable future it may become a practical problem. Some oceanographers estimate that 100,000 tons per square mile of useful minerals are concentrated in certain under-seas areas. Advances in oceanographic technology are bringing closer the exploitation of these mineral riches; thus control of these areas of mineral wealth could conceivably become an enormous problem.

The Geneva Convention on the Continental Shelf held in 1958 specified that a coastal nation had jurisdiction over its adjacent underseas bottom to a depth of 200 meters, or to whatever depth in the superjacent waters it was possible to exploit the natural resources. The author suggests that the Convention did not help solve the problem, since the only limit of a nation's jurisdiction is the criterion of exploitability, and future technology could increase the area of exploitability of 10,000 meters or more. Moreover, islands are given the same treatment as continental nations, so that possession of hitherto relatively unimportant islands could give France control of much of the Indian Ocean, Great Britain control of the South Atlantic, and the United States control of the North Pacific. He goes so far as to state that the Convention raised more problems than it solved.

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 15
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

PROPERTIES OF LOBSTER SHELL PIGMENTS

CHITINOLYTIC ENZYME IN DIGESTIVE TRACT OF YELLOWTAIL

DISCOLORATION OF CAROTENOIDS BY TISSUE HOMOGENATES

OWNERSHIP OF THE OCEAN FLOOR

8.58

STUDIES ON CHITINOLYTIC ENZYME PRESENT IN AQUATIC ANIMALS.
VI - THE CHITINOLYTIC ENZYME PRESENT IN RAINBOW TROUT

Okutani, Koichi (Dept. of Fish., Fac. of Agr., Kinki Univ., Osaka, Japan); Toshio Sawada (Section of Fish., Sizuoka Pref., Sizuoka, Japan); and Masao Kimata (Dept. of Fish., Fac. of Agr., Kyoto Univ., Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 10, 952-955 (October 1967)

Using precipitated chitin as the substrate, the authors investigated the chitinolytic activity in the stomach, liver, pyloric ceca, intestine, spleen, and gall bladder of rainbow trout, *Salmo irideus*. Chitinolytic activity was determined by measuring the total nitrogen-acetylamino sugar liberated by a mixture of tissue extract, chitin solution, buffer, and toluene after 6 hours' incubation at 22° C. The findings are tabulated below.

Organ	Chitinolytic activity at	
	pH 5	pH 7
	(mg. N-acetylamino sugar/g tissue)	
Stomach	280-300	46-91
Intestine (fore part)	100	0
Intestine (hind part)	40-80	0
Liver	15-50	11-23
Gall bladder	15	0
Spleen	0-10	0
Pyloric ceca	0	0

The optimum pH for chitinolytic action is about 4.5 and the optimum temperature about 30° C. Between a pH of 3 and 9, the activity of the enzyme can be gradually decreased by increasing the pH value. The enzyme is stable at temperatures of from 30° to 60° C. Above 60° C. it rapidly loses activity until at 80° it becomes almost completely inactive. [9 references]

8.59

of astaxanthin is altered by combination with protein. These parameters and the amino-acid composition are different in the yellow pigment. Denaturation of crustacyanin by guanidine hydrochloride or alkali produces separable yellow and colorless fractions that recombine stoichiometrically to give the blue pigment. The accessibility of the prosthetic group of the pigments is shown by the rapid reduction of the astaxanthin carbonyl groups with sodium borohydride; however, this reaction does not result in the formation of a covalent bond between the protein and the carotenoid. The bound carotenoid molecules are optically active and have maximal molar rotations of 105 to 106. The optical rotatory dispersion and circular dichroism spectra in the visible region show evidence for a splitting of the excitation that is similar to that predicted by exciton theory. The possible mechanisms of the perturbed optical properties of astaxanthin in crustacyanin are discussed. The authors suggest that intermolecular interactions of the electron system and/or distortion induced by the protein may account for the altered spectroscopic properties. [63 references]

Krinsky, Norman I. (Tufts Univ., School of Med., Boston, Massachusetts)
Chemical Abstracts 64, 1067h (January 3, 1966)

8.59 THE CAROTENOIDS OF THE BRINE SHRIMP, *ARTEMIA SALINA*
COMPOSITION AND TISSUE DISTRIBUTION OF CAROTENOIDS IN CRAYFISH
Wolfe, Douglas A., and David G. Cornwell (Ohio State Univ., Columbus, Ohio)
Chemical Abstracts 64, 1068d (January 3, 1966)

CHITINOLYTIC ENZYME IN RAINBOW TROUT

CAROTENOIDS IN CRAYFISH
SHRIMP

9.11

A resolution presented to the United Nations by Malta would give the UN control of the ocean floors beyond the Continental Shelf. Although this proposal is supported by some Congressmen, it is opposed by others, who are joined by various industrial groups. The author, too, criticizes the Malta proposal, on the grounds that if the ocean floor is as free as the air, then all nations should share its wealth, not just those in the UN. He adds that control by the UN would stifle initiative and curb capital investment. Summing up this second objection, he asks: Since offshore exploration is a high-cost, high-risk undertaking, why should industry enter into exploration if a part of the gain must be handed over to non-participants in the venture?

The conclusion of this editorial is that when more is known about the cost-to-benefit ratio of underseas exploitation, control of the ocean floor may become the subject of international agreement. Even then, the author doubts that the UN is the proper body to handle the matter because the agreement should be limited to the nations that have the will and the resources to engage in such costly and sophisticated projects.

Laddha, G. S. (Univ. Madras, India)
Chemical Abstracts 66, No. 24, 106633m (June 12, 1967)

MARINE CHEMICALS FROM SEA BITTERNS

8.8

discoloration at temperatures above 15° C. and even at 5° C. after 2 days' storage. Heat treating the tissue extracts at 100° C. for 10 minutes or adding 1 milliliter of 20 percent potassium cyanide inhibited the discoloring activity. Therefore, the authors concluded that some oxidative enzyme in the skin tissues may have caused the intensified discoloration by the skin homogenates.

Fish	Discoloring activity of skin homogenates on astaxanthin in fishes	
	3-Day incubation temperature (° C.)	Discoloring activity (% astaxanthin lost)
Rockfish (<i>Sebastes thompsoni</i>)	10±3	>50
Rockfish (<i>Helicolenus hilgendorfi</i>)	10±3	20 - 50
Channel rockfish (<i>Sebastes macrochir</i>)	10±3	>50
Gurnard (<i>Chelidonichthys kumu</i>)	5±2	>50
Gurnard (<i>Lepidotrigla aspera</i> , Gunther)	10±3	>60
Porgy (<i>Eymnis japonica Tanaka</i>)	10±3	20 - 50
Queen snapper (<i>Etelis evurus</i> , J & E)	12±2	>50
Grouper (<i>Epinephelus akaara</i>)	5	>50
Tilefish (<i>Branchiostegus japonicus japonicus</i>)	12±2	> 50
Cod (<i>Gadus macrocephalus Tilesius</i>)	12±2	<10
Alaska pollock (<i>Theragra chalcogramma</i>)	3±1	10 - 20
Sole (<i>Limanda yokohamae</i>)	15	20 - 50
Mackerel (<i>Pneumatophorus japonicus</i>)	10±3	>50
Horse mackerel (<i>Trachurus japonicus</i>)	12±2	10 - 20
Spotted parrot bass (<i>Oplegnathus punctatus</i>)	12±2	10 - 20
Conger eel (<i>Congrus megastomus</i>)	10±3	20 - 50
Grenadier (<i>Physiculus japonicus</i>)	3±1	<10

CHEMICALS FROM SEA BITTERNS

9.14 (*)	MUSCLE WEIGHT RELATIONSHIP TO SERUM PROTEINS, HEMOCYTES, AND HEPATOPANCREAS IN THE LOBSTER, <u>HOMARUS AMERICANUS</u> Stewart, James E., John W. Cornick, Diane M. Foley, M. F. Li, and C. M. Bishop (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia) Journal of the Fisheries Research Board of Canada <u>24</u> , No. 11, 2339-2354 (November 1967) Because the exoskeleton of crustaceans prevents a visual assessment of the physiological condition of the living animal, the authors wished to find a non-destructive method for determining the state of the animal. Stewart et al. (1967) showed that changes in hemocyte numbers and hemolymph protein levels in the lobster are directly related to changes in the diet. The authors felt that these measurements could be used in nutritional experiments as indices of the efficiency of the diet; this report describes the experiments used to test this hypothesis. Total serum protein values, hemocyte numbers, and muscle weights were determined for 216 intermolt lobsters (<u>Homarus americanus</u>) immediately after capture; the same determinations were made for an additional 230 lobsters held captive under a variety of dietary and environmental conditions. Depending upon experimental conditions, the average muscle values ranged from about 13 percent to a more normal 20 to 25 percent of the weight of the live animal. The total serum protein, up to a level of 55 milligrams per milliliter, was shown *Item on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: M. F. Tripple
9.15 (*)	SEASONAL VARIATION OF CAESIUM-137 FROM FALLOUT IN A CLAM, <u>RANGIA CUNEATA</u> GRAY Wolfe, Douglas A. (Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina) Nature <u>215</u> , No. 5107, 1270-1271 (September 16, 1967) Fallout of long-lived radionuclides, including cesium-137, in the northern temperate zone varies seasonally, with a maximum occurring during May-June and a minimum during November-December. Despite the moratorium on atmospheric testing, the amount of cesium-137 on the surface of the earth is still increasing because of its half life of 30 years and the huge stratospheric reservoir of radioactive debris. Although cesium is not a biologically important trace element, it chemically resembles potassium, which is the principal cation of cytoplasm. Therefore, the bioaccumulation of cesium is a subject of considerable interest. In the field study reported, the clam <u>Rangia cuneata</u> Gray was collected from six stations in the Trent-Neuse estuary in North Carolina, and the amount of cesium-137 in the soft tissues was measured for 18 months. The ratio of cesium-137 to potassium-40 in <u>Rangia</u> , at four upstream stations, showed a pronounced seasonal cycle; this season cycle was not so apparent in clams from downstream stations. The salinity of the water was measured coincidentally with the sample collections and also varied seasonally and reflected an inverse relation to the *Items on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: M. F. Tripple

DETERMINING NUTRITIONAL CONDITION OF LOBSTERS

SEASONAL VARIATION OF CESIUM IN A CLAM

9.16	COLUMBIA HATCHERIES: WILL THEIR SPECTACULAR SUCCESS FORCE B.C. TO FOLLOW? Anonymous Western Fisheries <u>75</u> , No. 1, 14-16, 18, 21-22, 25-26 (October 1967) British Columbia fisheries people are watching with close attention the hatchery-evaluation program being conducted in the 21 salmon hatcheries along the Columbia River. Following the early economic failures with sockeye hatcheries, the U.S. Bureau of Commercial Fisheries embarked on a 10-year program to prove that coho and chinook hatcheries could pay their own way. The program will end in 1970. At that time, American scientists will be faced with showing that the \$25 million spent on hatchery construction and the more than \$2 million a year spent in operating costs has not been wasted. Scientists of the Canadian fisheries department's Resource Development Branch are watching for solid evidence that the program is economically feasible. Up to now, natural salmon habitats in British Columbia have not been destroyed by construction of dams or serious pollution. When a stream fails through neglect or drought, the salmon can always migrate up one of the hundreds of other streams available. But the time will come when artificial spawning channels will not be sufficient to replenish the depleted runs. Then more drastic steps will have to be taken. So far, the Columbia River hatcheries have returned \$4 in fish caught for every \$1 spent in operation and maintenance. When the program began in 1960, every \$1 spent in operation and maintenance. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: L. Baldwin
9.17 (*)	21,000 PINKS SPAWNING IN NEW SETON CREEK CHANNEL Anonymous Western Fisheries <u>75</u> , No. 1, 12-13 (October 1967) Seton Creek, British Columbia, supported large numbers of spawning pink salmon every second year until a slide at Hells Gate blocked the channel. In 1945, fishways around the slide area were completed, and the runs began to return in large numbers. In 1947, about 1,000 pinks came back; in 1963, 129,000 returned; in 1965, 101,000 were counted. In 1956, a dam was built on Seton Creek by B.C. Hydro. Although it was designed so that it would not interfere with spawning runs, occasional high discharges at the dam upset the stability of the grounds, and some 30,000 square yards of spawning area were submerged in the forbay of the dam. To offset these effects, the International Pacific Salmon Fisheries Commission has built a 2-mile-long spawning channel just below the smaller channel that was opened in 1961. The small upper channel is 3,000 ft. long and 20 ft. wide and has a capacity of 7,000 spawners in its 6,700-sq.-yd. area. The new lower channel is 9,500 ft. long and 20 ft. wide and has a capacity of 20,000 spawners in its 21,000-sq.-yd. area. The spawning beds in both channels are made of prewashed gravel ranging in size from ½ to 4 in. Both draw a controlled flow of 40 cubic feet of silt-free water per second. The two channels provide about 2 sq. yd. of gravel surface for each pair of spawners. *Item on back of card. COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: L. Baldwin

COLUMBIA RIVER SALMON HATCHERIES

NEW BRITISH COLUMBIA SPAWNING CHANNEL

APPLICATION OF RADIOACTIVITY CARBON FOR STUDY OF NUTRITION AND FOOD INTERRELATIONS OF AQUATIC ANIMALS

within specified limits, it would have value
condition of wild lobsters. [24 references]

liver and herring.

Diet was more important than the temperatures of 5° to 14° C. in causing

9.14

Brungs, William A., Jr. (Natl. Center for Radiol. Health, Rockville, Maryland)

CALCIUM AND STRONTIUM IN SWEDISH WATERS AND FISH

any one sampling time. [9 references]

57.6

18

The channels will be operated only every other year. Fry will emerge from the gravel in April or May and be immediately carried downstream to the Fraser River and thence out to sea. Survival rates of fry in the channels are from two to four times as high as in the natural spawning grounds. In 3 years (1961, 1962 and 1965), the smaller upper channel produced an average of 3,250,000 pink fry a year. With both channels operating, the yearly production is expected to average between 13,000,000 and 15,000,000.

The protection and improvement of the Fraser River's salmon-spawning system is the job of the International Pacific Salmon Fisheries Commission. In the annual report issued in September 1966, the Commission outlined its work over the previous year and explained the latest thinking on pulpmill effluent problems, log driving, temperature control, spawning channels, and hatcheries.

Anonymous
Western Fisheries 73, No. 1, 18, 20, 22, 40-42 (October 1966)

Only 23,000 coho returned to the hatcheries; the gill-net catch was about 100,000 pounds. In 1966, about 280,000 returned, far more than were needed for eggs; 44,300,000 pounds were taken by gill net and about 1,800,000 pounds by sport fishermen.

Return of the coho has been almost 3 percent, an extraordinarily high figure that has been attributed to the 14-16 months of hatchery life it takes for them to reach the 5-6 inch release size. Chinooks are also raised, but their return record is as yet erratic. Possibly the 3-4 months of hatchery life is the cause. Yet that short time has its compensations, for the turnover is from three to four times as great as for coho, and the costs of raising a batch of release-size fingerlings are therefore much less.

The hatcheries produce about 70 million chinook fingerlings each year (at 90 fish to the pound) and about 30 million coho (at from 15 to 20 fish to the pound). Assuming all the eggs a female produced hatched and lived, only 10,000 coho and 14,000 chinook females would be needed to supply the hatcheries' yearly release.

The key to the sudden success along the Columbia has been an increased knowledge of the food and water needs of the young fish. The Oregon moist pellet, a tiny brown ball of food containing tuna viscera, fish meal, vitamins, and moisture, is fed to the fish many times a day. The water comes from wells or other underground sources. Future hatcheries will not be able to rely on this type of water, since it is becoming scarce; they will probably use sand-filtered river water that has been treated under ultraviolet ray lamps.

9.19 (*) Nicholson, H. Page (Southeast Water Laboratory, Federal Water Pollution Control Administration, U.S. Department of the Interior, Athens, Georgia) Science <u>158</u>, No. 3803, 871-876 (November 17, 1967) Methods based on interpretation of generally available information are suggested for evaluating water quality with respect to its content of selected groups of pesticides. These methods are intended to provide a base for discussion leading to the development of public policy for the inclusion of such values in water quality standards. In suggesting these parameters, the author made an attempt to simplify and to apply common denominators. An effect of 10-percent depression of acetylcholinesterase concentration in the fish brain is suggested as an upper limit for a large group of organophosphorus and carbamate compounds. This concept is superior to that of establishing values of water content for each of the 100 compounds involved as a means of measuring the suitability of the water environment. The selection of a means for measuring the effect of chlorinated hydrocarbon insecticides presents the following problems: (1) No single group effect exists to use as a basis of measurement. (2) Runoff from land is of greater significance with these insecticides than with acetylcholinesterase inhibitors because of the persistence of the chlorinated hydrocarbons and because the transport mechanism in runoff is poorly understood. (3) The concentrations that will not affect most aquatic animal life under conditions of long-term exposure are not *Items on back of card. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple	9.6 HAVE MARINE FISHERIES A FUTURE? Dierks, A. Have Marine Fisheries a Future? [In German], 227 pp. (1966) illus. (Carl Th. Gorge KG, Bremerhaven and Hamburg, Germany) World Fisheries Abstracts <u>18</u>, No. 3, 13-14 (July-September 1967) This book is a compilation of material discussed during the German Fishery Congress that was held in Bremerhaven May 20-21, 1966. In it, the problem of over-fishing is examined, and the problems created by political, biological, and physical aspects of the fisheries are scrutinized. The material contained is listed below. Purpose of the question, by A. Dierks. Aspects of the World Fisheries: The race between human population and food, by F. Baade. The sea, a food reservoir, by J. Kuehnau. The development of fisheries in the major fishing nations--Japan, China, U.S.S.R., U.S.A., by F. Bartz. The biological aspects of marine fishery exploration, by J. Lundbeck. The development of world markets for fishery products and fish meal, by H. Goeben. The Future of the German Sea Fisheries - Negative Factors: Extension of territorial waters and fishing limits, by G. Moecklinghoff. Have North Atlantic fishing grounds reached the limit of their yield? by U. Schmidt. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE EXTRACTOR: L. Baldwin
9.19 (*) Kilgen, Ronald H. (Department of Zoology and Entomology, Auburn University, Auburn, Alabama) Master of Science Thesis, 122 pp. (1966) (University of Southwestern Louisiana, Lafayette, Louisiana 70501) Water samples collected at 10 locations along the Vermilion River, in south-central Louisiana, were subjected to 11 different tests to determine the quality of the stream waters. Dissolved oxygen was below minimum requirements for most uses, and oxygen was depleted on several occasions. Low concentrations of oxygen indicated heavy organic pollution of the river. Results of the chemical oxygen demand tests showed the oxygen demand was frequently higher than 700 milligrams per liter. This indicated that a large amount of putrescible matter was present in the stream, and this matter accounted for the low dissolved-oxygen values. Relatively high chlorinity suggested pollution by either sewage effluents or oil-field brine effluents, or both. Alkalinity was lower than the optimum needed for the production of a good fish fauna. The pH was near optimum for the existence of most aquatic organisms. Salinity of the water was at times too high for irrigation purposes. Salinity variation paralleled that of chlorinity and indicated either sewage or oil-field brine wastes, or both. Conductivity of the water paralleled *Item on back of card. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple	9.7 OCEANOGRAPHY: WOODS HOLE AND MIT POOL THEIR RESOURCES Carter, Luther J. Science <u>157</u>, No. 3793, 1154-1157 (September 8, 1967) If the Massachusetts State Board of Higher Education approves a request by the Woods Hole Oceanographic Institution (WHOI) for degree-granting authority, an unprecedented step will be taken in American graduate education. WHOI and the Massachusetts Institute of Technology (MIT) are collaborating in a program in which a doctor of philosophy (Ph.D.) degree will be jointly conferred in the name of both institutions. Through the program, MIT will provide the background courses in science and languages that are essential to the degree; WHOI will provide a fleet of research vessels and a complex of laboratory facilities that no academic institution has the means to duplicate. Graduate students have for years done thesis work at such research institutions as Argonne, Brookhaven, and Oak Ridge, where they have had access to costly experimental equipment and to special skills and knowledge. But in the joint WHOI-MIT program, the two institutions will share the responsibility of conferring the degree. A joint education committee will establish academic standards, approve the courses, and appoint the subcommittee responsible for admissions, student financial aid, and examinations. The faculty for the degree program will be drawn from WHOI's research staff of about 129, all of whom hold ranks equivalent to university professorships. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: L. Baldwin
CONTROL OF PESTICIDE POLLUTION POLLUTION STUDY OF VERMILION RIVER, LOUISIANA	FUTURE OF MARINE FISHERIES GRADUATE TRAINING FOR OCEANOGRAPHERS

9.7

Staff members who participate in the program will teach a one-semester course every other year and supervise the research of one or two graduate students. During the next 5 years, WHOI expects to recruit as many as 150 additional people to help handle its part of the program.

The program is expected to cost about \$1 million a year, of which some 30 percent will be covered by research grants and contracts. Much of the new expenses arise from the inability to pay teachers with research contract funds. But, by the same token, WHOI will for the first time be able to participate in certain government grant-in-aid programs. It will also be able to apply for institutional support grants from the National Science Foundation and for facilities grants from the Office of Education. Its students will have the unexcelled advantage of having access to the outstanding library of the nearby Marine Biological Laboratory.

WHOI still hopes to establish a joint Ph.D. program with Harvard as well as with MIT, and later to develop similar programs with still other universities. The MIT-Harvard segments of the program were to have been complements--the MIT segment was to be concerned with ocean studies in the physical sciences; the Harvard segment, with ocean studies in the life sciences. At the moment, these plans are at a standstill, for Harvard has been unwilling to break precedent and award degrees with another institution.

9.6

Staffing and recruitment problems, by K. Terheyden.
Have the Germans no affinity with the sea? by A. Rehn.

- Positive Factors:

Old fishing traditions, by P. F. Meyer-Waarden.
Science--a must, by A. Bueckmann.
Today's fishing craft, by K. Wendel.
Development of catch techniques, by A. von Brandt.
Electrical fishing, the fishing method of the future? by C. O. Kreutzer.
Processing machines--the pacemakers, by J. J. Diestel.
The production chain of the fishery industry, by K. E. Heitmann.
Deep freezing, a revolution in preservation, by J. Kuprianoff.
Faster and better transportation of sea fish--by rail, E. H. Kockelkorn.
Faster and better transportation of sea fish--by road, by H. Dreescher and W. Bachmaier.
Sanitation tasks, by H. U. Kietzmann.
At the doorstep of new markets--marketing potential, by H. Gross.
The market--its reserves, by K. Bahr.
The importance of sea fish in modern nutrition, by F. Bramstedt.
Ship-owning companies hold the answer, by A. Dierks.

Whether or not fish frozen at sea will drive fresh iced fish from the market is still open to discussion. The consensus seemed to be, however, that the two types of fish are complementary rather than counteractive, from both the utilization and the economic profitability of fishing aspects.

61.6

chlorinity and salinity. At times the conductivity values were not optimum for a diversified aquatic community and were too high for irrigation purposes. Temperature fluctuated seasonally; however, the river did not freeze nor was the temperature too high for aquatic organisms or for irrigation purposes. The color of the water varied only slightly with station and date. Turbidity values were similar among stations. The values were higher following heavy rains. Excessive numbers of coliform bacteria provided the best indication of sewage pollution in the Vermillion River. The river apparently received large quantities of untreated or partially treated sewage.

The results indicated that the headwaters of the Vermillion River were relatively free from pollution; heaviest pollution occurred in and below the city of Lafayette. The stream seemed to recover to some extent by the time water reached Vermillion Bay; however, this recovery of the stream was probably due to dilution. Pollution in the Vermillion River was produced by a combination of effluents from sewage-treatment facilities, untreated sewage, industry, agricultural land drainage, barnyard runoff, and wastes from oil fields.

Templeton, W. L., and A. Preston (U.K. At. Energy Authority, Windscale, England)
Chemical Abstracts 67, No. 4, 14708g (July 24, 1967)

TRANSPORT AND DISTRIBUTION OF RADIOACTIVE EFFLUENTS IN COASTAL AND ESTUARINE WATERS OF THE UNITED KINGDOM

9.19

known, and the place where the effects will be predicted.
Monitoring a combination of stream water and sediment components of the aquatic ecosystem (5). The persistence of these compounds, and the difficulty of relating the presence of the radioisotopes to the place and time of their introduction.
A suggested practical solution to these problems would be establishing minimum permissible concentrations of insecticides in point-source discharges containing such materials. This is an attainable objective that would result in reduction of the concentrations of such persistent materials. [see references 62]

Kempf, Th., D. Luedemann, and W. Pflaum
Chemical Abstracts 68, No. 4, 15899c (January 22, 1968)

POLLUTION OF WATERS BY MOTOR OPERATION, ESPECIALLY OUTBOARD-MOTORS

9.19

Lowman, F. G., D. K. Phelps, R. McClin, V. Roman de Vega, I. Oliver de Padovani, and R. J. Garcia (Puerto Rico Nucl. Center, Mayaguez, Porto Rico)

INTERACTIONS OF THE ENVIRONMENTAL AND BIOLOGICAL FACTORS ON THE DISTRIBUTION OF TRACE ELEMENTS IN THE MARINE ENVIRONMENT

9.19

TRANSPORT AND DISTRIBUTION OF POLLUTANTS IN THE MARINE ENVIRONMENT
POLLUTION OF WATER BY OUTBOARD MOTORS

1.71 THE VANISHING 'ROCK SALMON'

(*)

Anonymous
New Scientist 35, No. 554, 126-127 (July 20, 1967)

The spurdog (*Squalus acanthias*) is a cartilaginous fish that accounts for about 99 percent of all dogfish landed in Britain. These fish constitute a large proportion of the fish sold by fish-and-chip shops, where they are called "rock salmon." In 1952, more than 14,000 tons of spurdog was landed in England and Wales; however, by 1965 only 5,500 tons was landed. Landings of spurdog by the Norwegian fisheries fell from over 30,000 tons in 1963 to just below 19,000 tons in 1965.

A vital factor in the decline of the spurdog is that the female produces only a few young at one time. She takes 2 years to produce a few large eggs, which are internally fertilized. The fertilized eggs remain inside the mother for 2 additional years, during which time the young develop to a length of about 11 inches. Then they are born. Because of the method of reproduction, the number of young entering a population is closely related to the number of females. The death rate of females is already so high that the point of population decline has been reached in the stock of spurdogs found in Scottish and Norwegian waters. (In fact, the point of population decline was probably reached several years ago.) The proposed solution to the problem of conservation of the spurdogs is to return small females to the water rather than keep them. [Abstracter: L. Baldwin]

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 21
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

2.113

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GUIDELINES FOR SELECTION OF MARINE MATERIALS

Tuthill, A. H., and C. M. Schillmoller (The International Nickel Company, Inc.)
Journal of Ocean Technology 2, No. 1, 6-36 (December 1967)

An extensive backlog of published data and experience is available to designers and users of marine equipment for the selection of economical materials that will give reliable and durable service. Charts and summaries of these data are presented in this paper to permit the designer to screen his initial selection of materials in terms of general wasting away, pitting crevice effects, fouling, velocity effects and cavitation, galvanic effects, selective attack, stress corrosion cracking, deep immersion, and cost. A series of application summaries is given with appropriate comments and a listing of the pertinent factors the designer should consider in the selection of materials for sea-water heat-exchange systems, propellers, stern tube bearings, marine hardware, fasteners, marine wire rope, buoys, and floating platforms.

The paper consists of a review of the performance of carbon steel, the basic construction material used in marine service, and a series of figures and tables summarizing the major corrosion factors the designer must take into consideration when upgrading from carbon steel to more durable metals. [23 references]

[Abstracter: M. F. Tripple]

*Items on back of card.

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 21
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

SHARKS

FISHING VESSELS

2.115 DESIGN OF THE MV DELAWARE II

(*)

Smith, Keith A. (Bureau of Commercial Fisheries, Exploratory Fishing and Gear Research Base, Gloucester, Massachusetts 01930)
Circular 273, 8 pp. (October 1967) (U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D.C. 20240)

The MV Delaware II is the exploratory fishing and gear research vessel of the Bureau of Commercial Fisheries now under construction. This vessel was designed as a stern ramp trawler of 155.5 feet length overall to act as a versatile platform for performing a wide variety of fishing and research jobs.

The duties of the Delaware II will be exploratory fishing, gear research, demonstration of methods and gear, and gathering of biological, chemical, and physical oceanographic data pertinent to fisheries. Special efforts were made to design an efficient stern trawler with a mechanized trawl-handling system. The design provides the capability for side trawling, clam and scallop dredging, long-lining, gill netting, and purse seining as well as for handling experimental fishing units and systems. The vessel will be powered by a 1,000-hp. diesel engine, has a service speed of 12.5 knots, a cruising radius of 8,000 miles, and the capacity of sustained operation at sea.

[Abstracter: M. F. Tripple]

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 21
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

2.119

(*)

LIFEJACKETS AND BELTS

Anonymous

Norwegian Fishing and Maritime News 14, No. 2, 11 (1967)

A lifejacket introduced 2 years ago by a Norwegian firm is approved for use by the maritime authorities of Norway, Sweden, Finland, and Iceland. The jackets are being used on board both the Norwegian and Swedish transatlantic liners and are being exported to European countries and overseas. The lifejackets are made according to the special requirements of the Scandinavian countries and in accordance with the requirements of the International Convention for Safety at Sea, London, 1960.

The two models of the lifejacket are made of orange-red nylon material with sewed-on reflectors. A signal whistle is provided with each jacket. The buoyance material is expanded polyethylene that is resistant to gas, oil, and other chemical and physical damage. Therefore, the jackets can be stored for a practically unlimited time. The jackets are extremely compact when in stored form.

The lifejacket is in demand for ferries and similar vessels where storage space is at a premium. The jacket is particularly suitable for the fisherman because it is easy to take on and off, and it is possible for him to work with both arms unrestricted while wearing the jacket, as it is neither heavy nor bulky.

[Abstracter: M. F. Tripple]

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COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 7 PAGE 21
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

FISHING VESSELS

SAFETY AT SEA

2.1127 RUBBER BAIT

Anonymous
Norwegian Fishing and Maritime News 14, No. 2, 45 (1967)

A rubber fish bait manufactured in Norway is suitable as a low-cost bait for many kinds of salt-water fish. The bait is in demand for handline fishing of cod, haddock, and coalfish on the ocean banks off Newfoundland, Greenland, Iceland, and Norway. The bait consists of diagonally cut rubber tube attached to a specially designed fishhook. The latex rubber is soft and springy, with a glossy texture and bright, attractive coloring. The bait is available in several sizes from 2 to 8 inches. During fishing operations, 10 to 20 baits are attached at 3-foot intervals along the line.

[Abstractor: M. F. Tripple]

[Extrator: L. Baldwin]

A new corrosion inhibitor that has a base of silicones and silicone resins is claimed to give longlasting protection against rust, corrosion, condensation, water, and salt-laden air. Sprayed onto metal, it forms a transparent, impermeable skin. It can be used to protect such metal work as pulley blocks, winches, rudder gear, metal cleats, and even engines laid up in storage. It is available in aerosol cans, each with a coverage of 70 sq. ft.; it can also be used from bulk drums or barrels with suitable spraying equipment to give a coverage of 2,000 sq. ft. per gallon.

[Extrator: L. Baldwin]

2.113 RUST AND CORROSION INHIBITOR

Anonymous
Shipbuilding International 11, No. 7, 27 (1965)
World Fisheries Abstracts 16, No. 1, 1 (January-March 1965)

FLORIDA STUDIES THE SHARK

Anonymous
Chemical and Engineering News 45, No. 50, 55 (November 27, 1967)

Studies have begun of new ways to utilize all the parts of the shark in an effort to revive the shark-fishing industry. Demand is so good for sharkskins that one company dealing with sharkskins does not even advertise because it cannot keep up with the demand for sharkskin products. However, the skins alone will not support a commercial shark-fishing venture, and the remainder of the shark is simply not in demand. Before 1950, shark fishing was profitable because of the demand for the vitamin A from the liver. When synthetic vitamin A appeared, the market for shark livers fell. Studies are in progress to determine if synthesized vitamin A is as good in quality as that obtained from shark livers. Meanwhile, other approaches are being investigated, such as using shark meat for crab bait or for producing fish meal. A plan is being worked out to have small fishmeal plants set to process sharks along with other trash fish. Making shark meat an edible commodity by smoking it has already been tried.

[Abstractor: M. F. Tripple]

The eel, though nutritious, palatable, and prodigiously abundant, has not been commercially utilized as it should be.

[Abstractor: L. Baldwin]

1.9 THE SUCCULENT EEL

Brewer, Herbert (31 Mordon Road, Maldon, Essex, England)
New Scientist 35, No. 555, 213 (July 27, 1967)

2.119

DESALTING KIT

Anonymous
Marine West 3, No. 4, 3 (1965)
World Fisheries Abstracts 17, No. 2, 2 (April-June 1966)

A pocket-sized desalting kit for converting sea water into drinking water will produce enough fresh water to keep a man alive for 8 days.

[Extrator: G. K. Chandler]

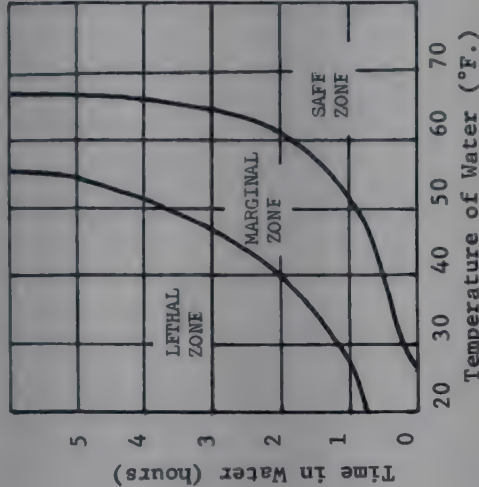
[Abstractor: M. M. Gwin]

2.119 BEAT EXPOSURE -- AND SURVIVE

Butlin, David
Western Fisheries 75, No. 3, 36 (December 1967)

HUMAN LIFE EXPECTANCY IN WATER

Fishermen who are shipwrecked or who fall overboard may have to remain in the water a long time before they are rescued. The worst enemy of the shipwrecked fisherman in northern waters is exposure. Exposure to cold water drains body heat and energy until the victim dies of exposure, rather than by drowning. As can be seen from the chart, death will occur after about 70 minutes of exposure in 30°-F. water. Wearing a wet suit of the type used by skin divers insulates the body against cold by maintaining a thin film of water, at body temperature, between the skin and the suit. A wet suit also provides about 18 pounds of buoyancy, which is more than many life jackets provide. The author feels that the use of wet suits in case of emergency would reduce the fatalities from exposure.



[Abstractor: M. F. Tripple]

2.1128 EFICIÊNCIA DE ARMADILHAS NA CAPTURA DE LAGOSTA
[EFFICIENCY OF TRAPS IN THE CAPTURE OF LOBSTERS]

Silva, Virgilio Ribeiro Carneiro da (SUDENE)
Boletim De Estudos De Pesca 5, No. 4, 7-27 (July-August 1965) (SUDENE Edf. Entrep. Federal de Pesca, Cais de Santa Rita - 8.º andar, Recife, Brazil) (In Portuguese, English summary)

Catching capabilities of the three types of commercial lobster traps (vane, box, and maltese cross) used in northeast Brazil were analyzed. It was hoped that significant differences in the efficiencies of the traps would justify the selection of one of the traps as a superior replacement.

Analyzed were 127 catches by maltese cross trap, 168 by box trap, and 213 by vane trap. Descriptions of traps, procedure, and tabulations are included in the paper. On the basis of only catch rate, the vane trap usually provided the best yields. This type of trap is equal in cost and durability to the other traps studied.

[Abstractor: M. M. Gwin]

STRESSING SHARKS
FISHING GEAR

SAFETY AT SEA
FISHING GEAR
SAFETY AT SEA

PRESERVATION AND SHELLING OF CRUSTACEANS

3.334
British Patent 1,047,084
Abstracts from Current Scientific and Technical Literature 20, Abstract No. 188,
p. 36 (January 1967)

The crustaceans, for example shrimps or prawns, are boiled, cooled, and freeze dried; then conveyed over a stationary surface by a member which exerts light pressure and crushes the shells.

[un] Baldwin

The crustaceans, for example shrimps or prawns, are boiled, cooled, and freeze dried; then conveyed over a stationary surface by a member which exerts light pressure and crushes the shells.

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The crustaceans, for example shrimps or prawns, are boiled, cooled, and freeze dried; then conveyed over a stationary surface by a member which exerts light pressure and crushes the shells.

IMPROVEMENTS IN AND RELATING TO THE DRYING OF FISH

3.61
British Patent 1,056,844
Abstracts from Current Scientific and Technical Literature 20, No. 4, Abstract No. 880, p. 169 (April 1967)

A process is described for the drying of unsalted, nonfatty fish, which have an initial water content of at least 350 percent on a dry weight basis. As the water content of the fish is decreased during processing, the drying temperature is increased so that the fish is maintained at a maximum temperature, which does not cause thermal damage. The temperature extremes are given for each range of water content in fish. Five types of apparatus, which are suitable for this drying process, are described.

[Abstracter: M. M. Owin]

The spray-drying method of processing exceeds all other dehydration methods in both volume and value of product. This method works well in the processing of liquids, suspensions, and slurries, particularly when high-tonnage production of heat-sensitive materials is important. Its operational simplicity in practical terms is an advantage to the food processor. From studies on spray drying, the following projects have been selected as problems of concern to the food industry: (1) production of a high-fat powder for bakery use, and (2) effects of freezing and drying on the dispersibility of fat globule membrane materials.

ASHRAE Journal 2, No. 3, 70-73 (March 1967)

Amundson, C. H. (Dept. of Food Science and Industries, University of Wisconsin, Madison)

SPRAY DRYING DAIRY AND FOOD PRODUCTS

3.60

FROZEN SEAFOOD

3.230
U.S. Patent 3,255,021
Chemical Abstracts 65, 6204c (August 15, 1966)

THERMISTOR CRYSCOPY IN THE FOOD INDUSTRY

3.231
Henningson, R. W. (Clemson Univ., Clemson, South Carolina)
Chemical Abstracts 66, No. 23, 104041c (June 5, 1967)

The causes of undesirable odors and tastes in foodstuffs are considered. These undesirable qualities may be caused by the printing and the printing ink, the adhesive used in the package and the sealing, or by the packaging material itself. Various test methods are mentioned for those odors that cannot be detected by vapor-phase chromatography.

ODOUR AND TASTE IN PACKAGING

3.2385
Sacharow, S.
Verpakkung 19, No. 1, 7-9 (1966)
Food Science Abstracts 1, No. 7, Abstract No. 67-906, p. 334 (July 1967)

The causes of undesirable odors and tastes in foodstuffs are considered. These undesirable qualities may be caused by the printing and the printing ink, the adhesive used in the package and the sealing, or by the packaging material itself. Various test methods are mentioned for those odors that cannot be detected by vapor-phase chromatography.

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(1961 July) 434 333 p. p. 7, 907/69 No. 07 Abstract No. 67-906, p. 334 (July 1967)

FINDING AND MEASURING TRANSFERRABLE FLAVORS IN FLEXIBLE PACKAGING MATERIALS

Fleckenstein, J.

3.2385

4.15
(*)

ALKOXYLIPIDS. III - NATURALLY OCCURRING
D(+)-1-O-CIS-ALK-1'-ENYL-DIGLYCERIDES

Schmid, Harald H. O., Wolfgang J. Baumann, and Helmut K. Mangold (University of Minnesota, The Hormel Institute, Austin)
Biochimica et Biophysica Acta, Lipids and Lipid Metabolism 144, No. 2, 344-354 (October 2, 1967)

Alkoxy lipids are apparently widespread in nature. Mixtures of alk-1-enyl-diglycerides (neutral plasmalogens), alkyl-diglycerides (alkoxydiglycerides), and triglycerides can be resolved by adsorption chromatography. This method was used to isolate small amounts of the two types of alkoxy lipids from human perinephric fat and from beef heart, where they occur at a level of about 0.1 percent each.

Liver oil of the ratfish, *Hydrolagus colliel*, a small shark native to the waters of the Pacific coast, contains about 5 percent of alk-1-enyl-diglycerides and large amounts of alkyl-diglycerides. Thus, this ratfish constitutes a convenient source for these unusual lipids. This report records some physical characteristics and chemical reactions of alk-1-enyl diglycerides. Analyses are reported of the long-chain aldehydes and fatty acids derived from alk-1-enyl-diglycerides of the alkyl glyceryl ethers and fatty acids from alkyl-diglycerides, and of the constituent fatty acids of triglycerides. The physical characteristics and the analyses of the two types of alkoxy lipids support the suggested metabolic interrelation. [21 references] [Abstract: M. F. Tripple]

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COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 7 PAGE 25
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

4.92
(*)

PROMOTION OF MYOPATHY BY POLYUNSATURATED FATTY ACIDS
OF COD LIVER OIL

Jenkins, K. J. (Animal Research Institute, Canada Department of Agriculture, Ottawa, Canada), and L. M. Ewan (Department of Biochemistry, School of Biological Sciences, University of New South Wales, Sydney, NSW, Australia)
Canadian Journal of Biochemistry 45, No. 12, 1873-1880 (December 1967)

Recent studies by one of the authors have shown that cod-liver oil, as well as lard, will interfere with selenium protection against chick myopathy, though the liver oil contains low levels of linoleic and arachidonic acids and a high proportion of polyunsaturated fatty acids of the linolenic acid family. The experiment reported here was undertaken to determine the fatty acid compounds of cod-liver oil that are responsible for the selenium antagonism.

Supplementing the dystrophogenic basal diet with 4 percent of cod-liver oil markedly inhibited the protectiveness of selenium and the sulfur amino acids against development of myopathy. Results obtained from feeding various fractions of the oil showed that none of the myopathy-promoting effect was related to the unsaponifiable or saturated fatty acids, although it was chiefly associated with the eicosapentaenoic (20:5) and docosahexaenoic (22:6) fatty acids. The significance of the results in the development of myopathy is discussed in relation to effects of dietary lipids and vitamin E deficiency on the composition and stability of cell membrane phospholipids. [14] references [Abstract: M. F. Tripple]

*Items on back of card.

COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 7 PAGE 25
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

CHEMICAL AND PHYSICAL PROPERTIES OF OILS
NUTRITION OF OIL

6.132
(*)

SOLVENT EXTRACTION OF FISH MEAL

Utvik, A. Ø.
Meldinger FRA SSF, No. 3, 56-61 (September 1966) (In Norwegian)
World Fisheries Abstracts 18, No. 3, 47-48 (July-September 1967)

Previous work on solvent extraction of lipids from fish meal is reviewed. The extraction process has attracted new interest because of an increasing demand for low-fat fish meals and because of the improvement in processing techniques and equipment.

Removal of fines from the micella or from the extracted oil still seems to be a problem--filters tend to clog up, and ordinary centrifugation is insufficiently effective. This problem, together with the fact that the oil extracted from presscake or meal is darker in color and higher in free fatty acids than is the oil expressed from the raw material, makes marketing the solvent-extracted oil residue a doubtful undertaking. More research is needed to solve the problem.

Experiments on the palatability of hexane-extracted fish meal for mink are mentioned, and different types of extractors are illustrated.

[Extractor: L. Baldwin]

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COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 7 PAGE 25
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

9.125
(*)

STARFISH GONAD: ACTION AND CHEMICAL IDENTIFICATION
OF SPawning INHIBITOR

Ikegami, S., and S. Tamura (Department of Agricultural Chemistry, University of Tokyo, Bunkyo-ku, Tokyo, Japan), and H. Kanatani (Ocean Research Institute, University of Tokyo, Nakano-ku, Tokyo, Japan)
Science 158, No. 3804, 1052-1053 (November 24, 1967)

The gamete-shedding substance obtained from the radial nerves of starfish induces spawning when it is applied to the gonads of mature starfish in vivo and in vitro. A substance that inhibits the action of this spawning factor is present in both ovary and testis of starfish. This substance has been isolated from testis of *Asterina pectinifera* and has been chemically identified as L-glutamic acid.

[Abstract: M. F. Tripple]

*Item on back of card.

[Abstract: L. Baldwin]

The importance of dissolved food to starfish may give a clue to their control.

Starfish feed in two ways: by continuous absorption of dissolved organic substances through the body wall of the under surface (this food is used largely by the outer tissues), and by intermittent oral ingestion (this food is used to satisfy the needs of the animal in general and the internal organs in particular).

New Scientist 35, No. 555, 207 (July 27, 1967)

Anonymous

STARFISH SKIN SOAKS UP FOOD

COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 7 PAGE 25
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

MANUFACTURE OF FISH MEAL AND OIL
ICHTHYOLOGY

4.99 MECHANISM OF THE EFFECT OF RETINOIC ACID AND SQUALENE ON VITAMIN K DEFICIENCY IN THE RAT

Matschiner, John T., J. M. Amelotti, and E. A. Doisy, Jr. (Department of Biochemistry, St. Louis University School of Medicine, St. Louis, Missouri)
Journal of Nutrition 91, No. 3, 303-306 (March 1967)

Adult male rats were fed purified diets deficient in vitamin K to study the anticoagulant effect of squalene and retinoic acid. Both squalene and retinoic acid appeared to inhibit absorption of vitamin K, although different mechanisms may be used. The requirement for vitamin K increased with a dietary increase of squalene. However, maximal action of retinoic acid was easily obtained and additional vitamin A did not affect prothrombin levels. The requirement for vitamin K in rats fed 0.5 percent squalene was about 9 micrograms per day, which was similar to the requirement in germ-free rats. With this knowledge, the authors hypothesized that the production of a "simple" vitamin K deficiency in mammals may be induced by indigestible oils and retinoic acid. [12 references]

Abstracter: M. M. Gwin]

9.19 STUDIES ON THE POST-MORTEM IDENTIFICATION OF THE POLLUTANT IN THE FISH KILLED BY WATER V - DETECTION OF COPPER IN THE FISH

Kariya, Teiji, and Yoshiko Haga (Dep. Fish. Fac. Agr. Toboku Univ., Japan); Hideo Haga (Sendai High School, Kita-8-Sendai, Japan); and Tsutomu Tsuda (Kasumi-gaura-Kitaurs Fish. Office, Ibaragi Pref., Japan)

To determine the amount of copper that fish living in copper-polluted water will absorb, the authors exposed five species of fishes to varied concentrations of four copper-containing solutions. The fishes were Carassius auratus, Salmo gairdneri [sic] irideus, Zacco platypus, Jribolodon hakonensis, and Pseudogobio esocinus; the pollutants were copper sulfate and solutions used in acidic copper plating, alkaline copper plating, and brass plating. Since normal fish contain less than 2.2 γ of copper per gram of body weight, any amount over 2.2 γ was considered excess.

The fish were exposed to the polluted solutions until they died or for 48 hours, whichever came first, and then analyzed for excess copper content. Seven tables are given specifying the concentration of copper (in parts per million), the body length and weight of the fish, the survival time (in hours), and the amount of excess copper found in the dead fish. Some of the tables give these data for particular species of fish [Abstracts L. Baldwin]

4.13 HYDROCARBONS IN DIGESTIVE TRACT AND LIVER OF A BASKING SHARK

Blumer, Max (Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543)
Science 156, No. 3773, 390-391 (April 21, 1967)

The hydrocarbons of plankton, upon which sharks feed, pass through the digestive tract of the shark without being fractionated or modified structurally, are resorbed in the spiral valve, and are then deposited in the liver. Because the concentrations of hydrocarbons found in the digestive tract and the liver are good indications of where and upon what the shark has fed, analyses of the hydrocarbon assemblage is useful in tracing the movement of the shark.

A juvenile male basking shark, Cetorhinus maximus (Gunnerus), was dissected, and samples of its liver were analyzed. Samples of mixed zooplankton were analyzed for comparison with samples from the shark. Phytane, which would have been detected at a ratio of 1 part phytane to 20,000 parts pristane, was not observed. Squalene, which occurs only in small amounts of zooplankton, was abundant in the shark's liver. The drop in concentration of C₂₀ diolefin between the pyloric limb of the stomach and the spiral valve did not reflect the action of the C₁₉ di- and triolefins. Nor was the comparative stability of the olefinic hydrocarbons in the digestive system reflected by the pronounced alteration of the unsaturated fatty acids. The distribution of hydrocarbons in the shark's liver agreed markedly with the hydrocarbon distribution patterns in the zooplankton.

[Abstracter: L. Baldwin]

6.130
DIAGRAM OF FISH MEAL PLANT

Anonymous
Proc. Symposium, Canadian Committee Fats, Oils, pp. 61-62 (1966)
Food Science Abstracts 1, No. 3, Abstract 67/282, p. 97 (March 1967)

Diagrams of a plant used for the production of fish meal and oils, and the flow of material through such a plant are given.

6.130 PROCESSING OF FISH WASTES

Sozynski, J., and Z. Kajetanowicz (Wyższa Szkoła Rolnicza, Szczecin, Poland)
Chemical Abstracts 68, No. 1, 2109v (January 1, 1968)

MANUFACTURE OF FISH MEAL FOR HUMAN AND ANIMAL CONSUMPTION

Netherlands Patent Application 6,512,344
Chemical Abstracts 67, No. 9, 42737j (August 28, 1967)

DETERMINATION AND PERSISTENCE OF ETHYLENE OXIDE IN MEAT, FISH, AND BONE MEAL AFTER STERILIZATION

Kocacelli, G., V. Marazza, and G. Reina (Univ. Milan, Italy)
Chemical Abstracts 67, No. 5, 20774s (July 31, 1967)

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Chilling and freezing of foods	2	0.6			
Fish products	2	0.6			
Nutrition from the sea three decades hence	2	0.6			
FROZEN FISH, PROCESSING					
New trends in cooling and freezing fish	23	3.231			
Production line for fish sticks	23	3.237			
Use of thermistor cryoscopy in the food industry	24	3.231			
GEAR, FISHING					
Method for tapering purse seines	5	2.1112A,B,C,			
Efficiency of different gill nets	6	2.1126			
Rubber fish bait for handlining	22	2.1127			
Capabilities of lobster traps	22	2.1128			
HANDLING FRESH FISH					
Shipping container for fresh fish	7	2.41			
Automatic dressing apparatus for fish and meat (Br. Pat. 1,027,313)	8	2.3			
HERRING AND SIMILAR SPECIES					
Arctic capelin fishery	3	1.26			
SAFETY AT SEA					
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Pocket-size desalting kit for seamen	22				2.119
Surviving exposure in northern waters	22				2.119
SALMON					
Replenishing Atlantic salmon stocks	3				1.36
SALT FISH					
Curing and packing salted fish (Can. Pat. 1,077,644)	23				3.5
Effect of salting on amino-acid content of herring	23				3.5
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Conservation of dogfish	21				1.71
Plans for marketing sharks	22				1.70
SHRIMP					
Method for freezing shrimp (U.S. Pat. 3,255,021)	24				3.230
SPOILAGE					
Bacteriological survey of breaded-fish industry	3				2.01
Survival of <u>Clostridium botulinum</u> in smoked fish	3				2.05
TUNA					
Promoting the tuna market	4				1.120
VESSELS, FISHING					
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WORLD FISHERIES AND MISCELLANEOUS OCEANIC FISHERIES					
Future of marine fisheries	19				9.6

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